

For more info:

www.MrCircuitTechnology.com

Gary@MrCircuitTechnology.com

Mr Circuit Technology

Science/Electronics Experiment Kits and Labs


Exp. 29 - "FANTASY SPACE MACHINE GUN"

LESSON PLAN

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- Page 09 - Answers to Crossword
- Page 10- Answers to Word Search
- Page 11 - Answer Key to Written Quiz
- Page 12 - Poster to put up on classroom wall
- 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.)

**LEARN more today,
EARN more tomorrow!**

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Experiment Parts Kit
#MC1-29-PK
"Fantasy Space
Machine Gun
Circuit"
Exciting, Educational
and Fun



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

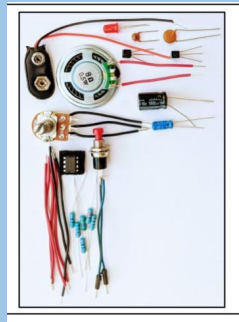
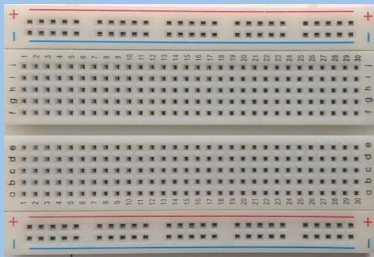
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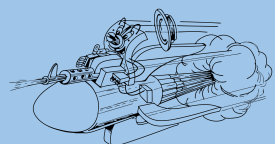
PREPARATION: You can put the Page 12 poster up on your classroom wall to announce the fact that you are going to do the Science-Electronics Experiment.

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 #MC1-29-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.

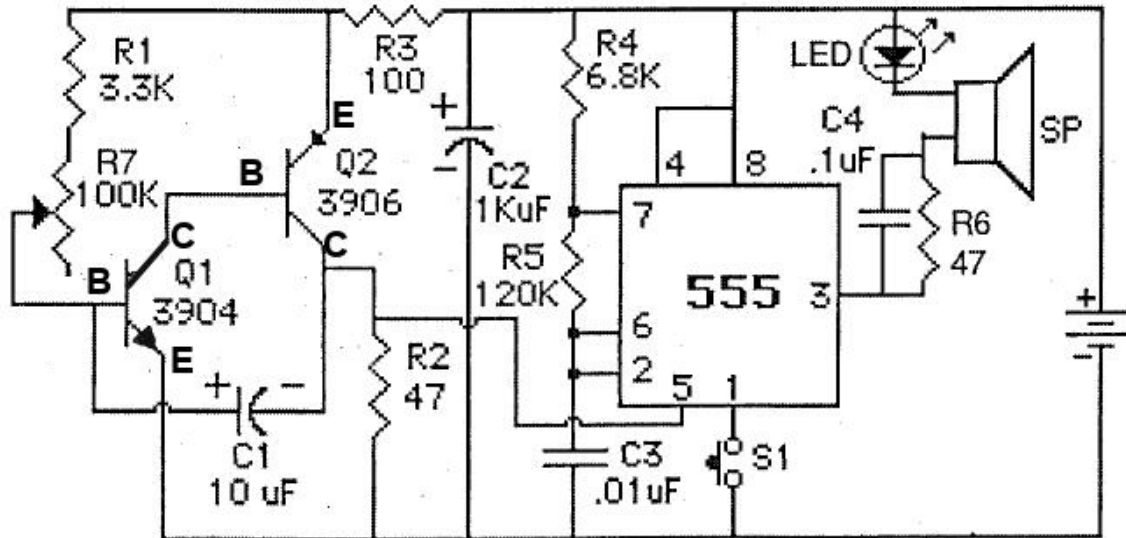
Step 4 - Collect all the Written Quizzes for grading and use the Answer Key to grade them.



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 FANTASY SPACE MACHINE GUN circuit. Here is the SCHEMATIC DIAGRAM of the circuit you will build.

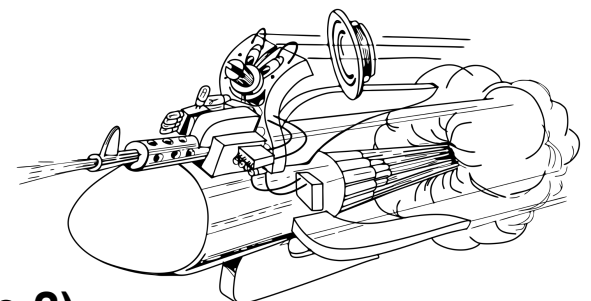


This interesting circuit was invented by engineers who wanted a circuit that would make sounds similar to a fantasy space machine gun or phaser gun like in Space Arcade Games.

This is a fun circuit to play with. You can use it when playing with friends on your outer space journeys.

Mr Circuit is flying in his space rocketship.

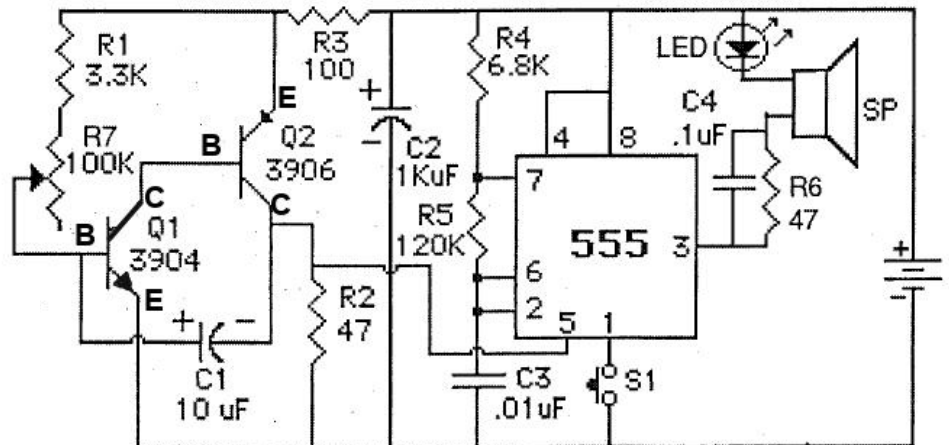
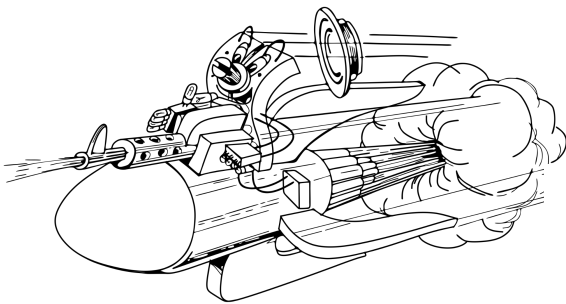
It is amazing how many circuits can be made with a few well chosen electronic components.



(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 FANTASY SPACE MACHINE GUN circuit that you will build.



This circuit has two oscillators. Transistors Q1 and Q2 form one oscillator. The 555 IC is the other 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, which is the 'trigger', while continuously adjusting the potentiometer, you can create some interesting space machine gun sounds.

(Continue to Page 3)

PURPOSE OF THIS EXPERIMENT

MC1-29-R-3

*** To build an FANTASY SPACE MACHINE GUN Using a 555 Integrated Circuit.

Speaker



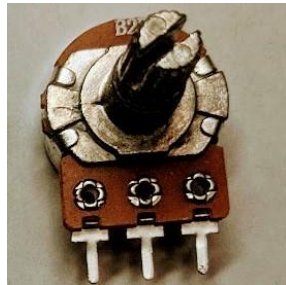
PARTS NEEDED FOR EXPERIMENT

In this experiment, you will use the following:

9V Battery Snap



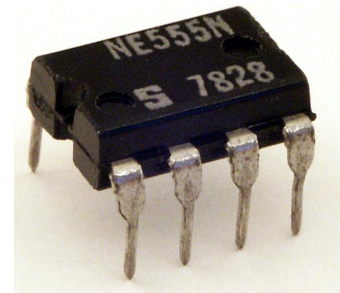
Potentiometer



0.01uF Cap



555 IC



LED



2 of 47 Ohm resistor



100 Ohm resistor



100 Ohm resistor



3.3k Ohm resistor



6.8k Ohm resistor



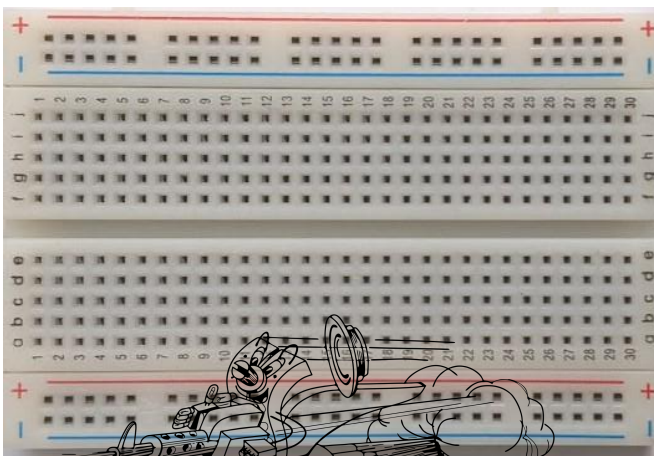
120k Ohm resistor



9 Jumper Wires



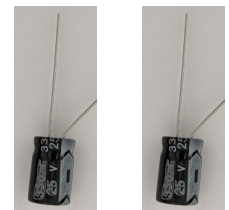
Solderless Circuit Board



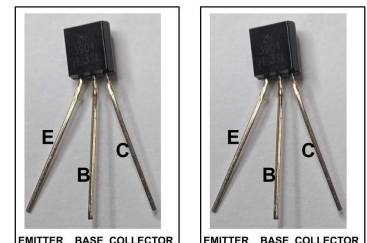
N/O Push Button Switch



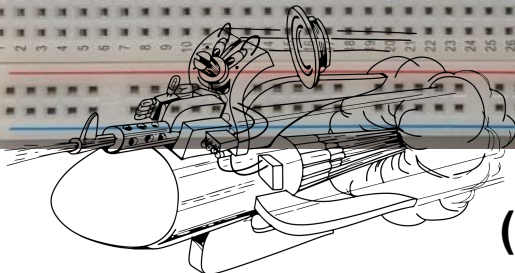
10uF & 1000uF Capacitors



NPN & PNP Transistors



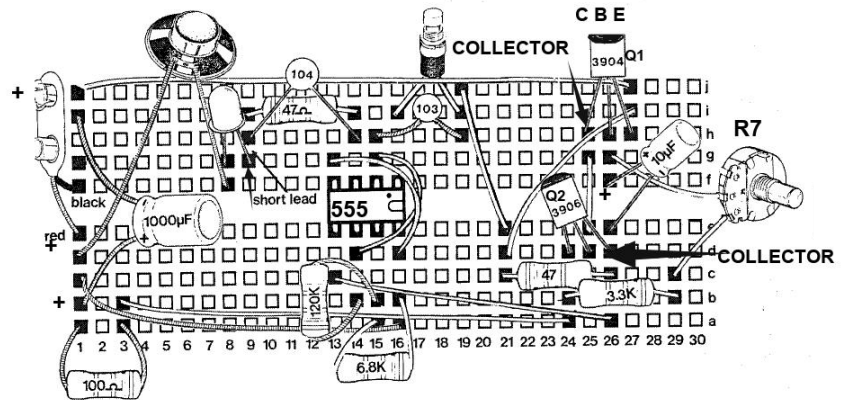
You will also need a good 9 Volt battery (Continue to Page 4)



DO THE EXPERIMENT (part 1 of 2)

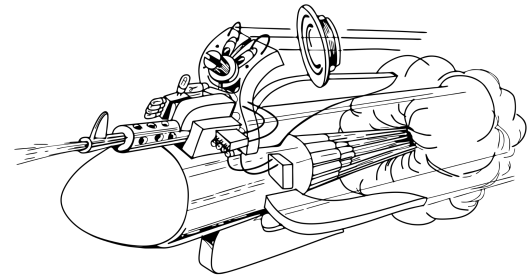
MC1-29-R-4

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



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

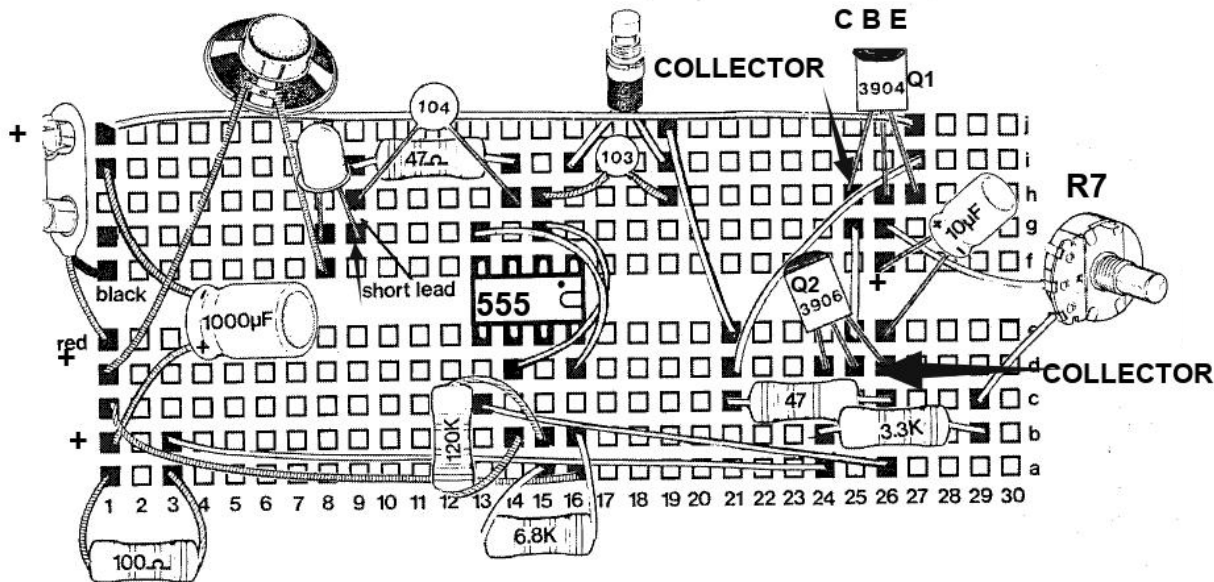
- Install an LED - Long lead in hole 8g - Short lead in hole 9g
- Install a 47 Ohm resistor (yellow, violet, black, gold) in holes 9i TO 14i
- Install a 47 Ohm resistor (yellow, violet, black, gold) in holes 21c to 26c
- Install a 100 Ohm resistor (brown, black, brown, gold) in holes 1a to 3a
- Install 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 120k Ohm resistor brown, red, yellow, gold) in holes 14b to 15b
- 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 9h to 14h
- Install a 10uF Electrolytic Capacitor - Long lead in hole 26f Short lead in hole 26e
- Install a 1000uF Electrolytic Capacitor - Long lead in hole 1b Short lead in hole 1i
- Install a Push Button Switch in holes 16i to 19i
- Install a Potentiometer - middle lead in 26g, edge lead in 29c
- Install Speaker from hole 1d to 8f
- Install Jumper Wire #1 in holes 1c to 16a **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 19j to 21e
- Install Jumper Wire #7 in 13c to 26a **AND** Install Jumper Wire #8 in holes 25e to 25g
- Install Jumper Wire #9 in 21d to 27i
- Install the Battery Snap, Black lead in hole 1f and Red Lead in hole 1e



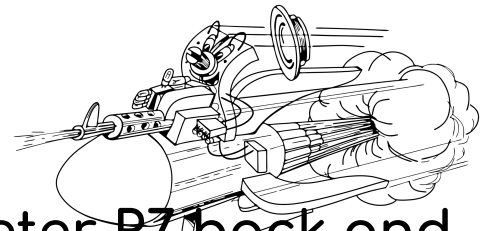
(Continue to Page 5)

DO THE EXPERIMENT (part 2 of 2)

MC1-29-R-5



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 shaft on the Potentiometer R7 back and forth, you can change the 'firing rate' of the space machine gun sounds. You can use this circuit with your friends as you plan journeys through space. Have fun!

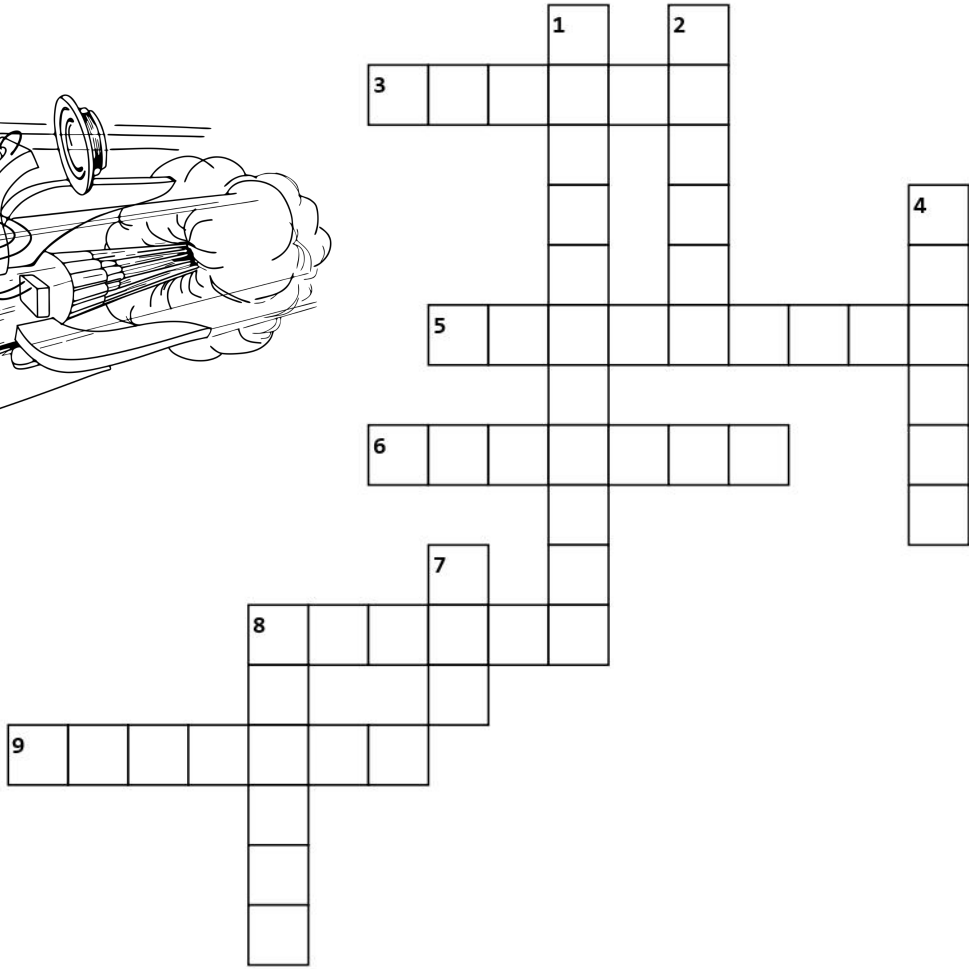
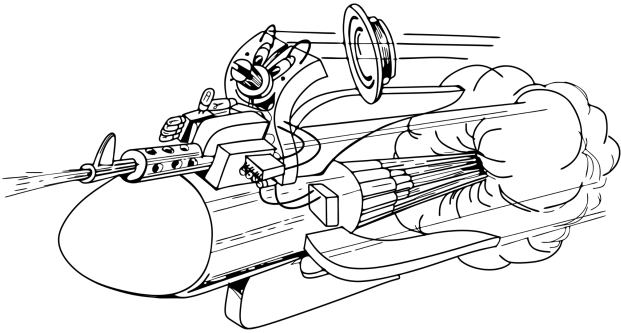


CONCLUSION: You should have observed that you can build an **FANTASY SPACE MACHINE GUN** circuit with a 555 Integrated Circuit and two transistors.

(End of Experiment 29)

CROSSWORD

Exp. 29 - "FANTASY SPACE MACHINE GUN"



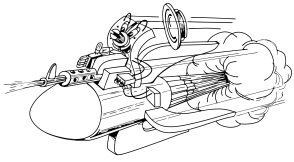
Across

- 3. This circuit is known as a Fantasy Machine Gun circuit or _____ Gun circuit.
- 5. The _____ of transistor Q1 is connected to the Base of transistor Q2.
- 6. This circuit is powered by a 9 Volt _____ .
- 8. This circuit has two oscillators connected in _____ .
- 9. The Push Button switch is the _____ for this circuit.

Down

- 1. This circuit has two _____ .
- 2. This circuit makes sounds in in SPACE _____ GAMES.
- 4. The _____ rate is controlled by potentiometer R7.
- 7. This circuit uses _____ fixed resistors.
- 8. The first oscillator circuit 'injects' a _____ to Pin 5 of the 555 IC.

Exp. 29 - "FANTASY SPACE MACHINE GUN"



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

1. This circuit has two of these connected in series.
2. The _____ is used to adjust the firing rate of the circuit.
3. This circuit generates a _____ sound.
4. This circuit makes sounds like a Space _____ game.
5. The first oscillator in this circuit is made up of two _____ .
6. The second oscillator in this circuit is made using a 555 _____ Circuit.
7. The two oscillators in this circuit are connected in _____ .
8. The Push Button switch in this circuit is used as a _____ for the fantasy space machine gun.
9. Who created this circuit?
10. To vary the sounds emitting from this circuit, you use the potentiometer along with the Push Button _____ .



QUIZ for Exp 29 or STEM KIT #29 in the Mr Circuit Electronics Training Lab 1

This Quiz covers the training learned by completing



“Build a Fantasy Space Machine Gun Circuit” Experiment 29

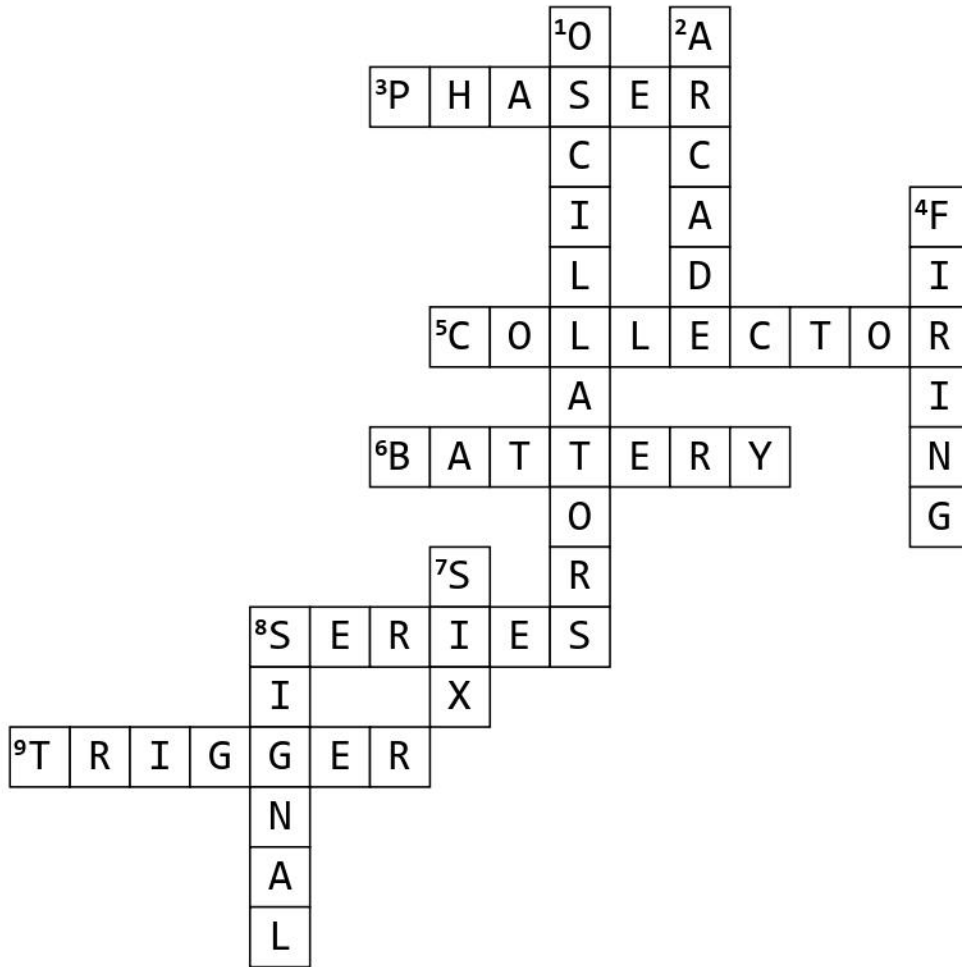
Circle the letter for your answer to each question and then hand this quiz in to your teacher.

- Questions #1-10 with multiple choice options A-D. Includes a 555 timer IC image.

Score []

ANSWERS FOR CROSSWORD

Exp. 29 - "FANTASY SPACE MACHINE GUN"



Across

3. This circuit is known as a Fantasy Machine Gun circuit or _____ Gun circuit.
5. The _____ of transistor Q1 is connected to the Base of transistor Q2.
6. This circuit is powered by a 9 Volt _____ .
8. This circuit has two oscillators connected in _____ .
9. The Push Button switch is the _____ for this circuit.

Down

1. This circuit has two _____ .
2. This circuit makes sounds in in SPACE _____ GAMES.
4. The _____ rate is controlled by potentiometer R7.
7. This circuit uses _____ fixed resistors.
8. The first oscillator circuit 'injects' a _____ to Pin 5 of the 555 IC.

ANSWERS FOR WORD SEARCH

Exp. 29 - "FANTASY SPACE MACHINE GUN"

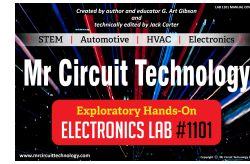
R	Z	N	O	J	Y	V	O	V	L	J	M	S	E	O	K	O	F	P	A
M	U	R	W	K	T	E	E	C	L	L	I	M	V	T	Q	G	F	K	U
A	E	A	A	N	Z	M	Z	U	E	F	I	W	P	D	O	V	W	E	B
X	Q	S	K	S	R	O	T	S	I	S	N	A	R	T	L	K	Y	C	L
E	B	L	P	E	A	O	E	K	T	Q	X	F	A	F	B	K	H	Y	B
Y	R	E	T	E	M	O	I	T	N	E	T	O	P	O	Q	F	N	A	S
E	F	M	S	K	W	H	S	L	T	Q	Z	D	J	C	Q	J	H	R	Y
N	J	B	W	B	D	C	E	Y	J	P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

- This circuit has two of these connected in series.
- The _____ is used to adjust the firing rate of the circuit.
- This circuit generates a _____ sound.
- This circuit makes sounds like a Space _____ game.
- The first oscillator in this circuit is made up of two _____ .
- The second oscillator in this circuit is made using a 555 _____ Circuit.
- The two oscillators in this circuit are connected in _____ .
- The Push Button switch in this circuit is used as a _____ for the fantasy space machine gun.
- Who created this circuit?
- To vary the sounds emitting from this circuit, you use the potentiometer along with the Push Button _____ .

**QUICK-CHECK ANSWER KEY for Experiment 29 QUIZ
for Mr Circuit Electronics Training (“Fantasy Space Machine Gun”)**

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.

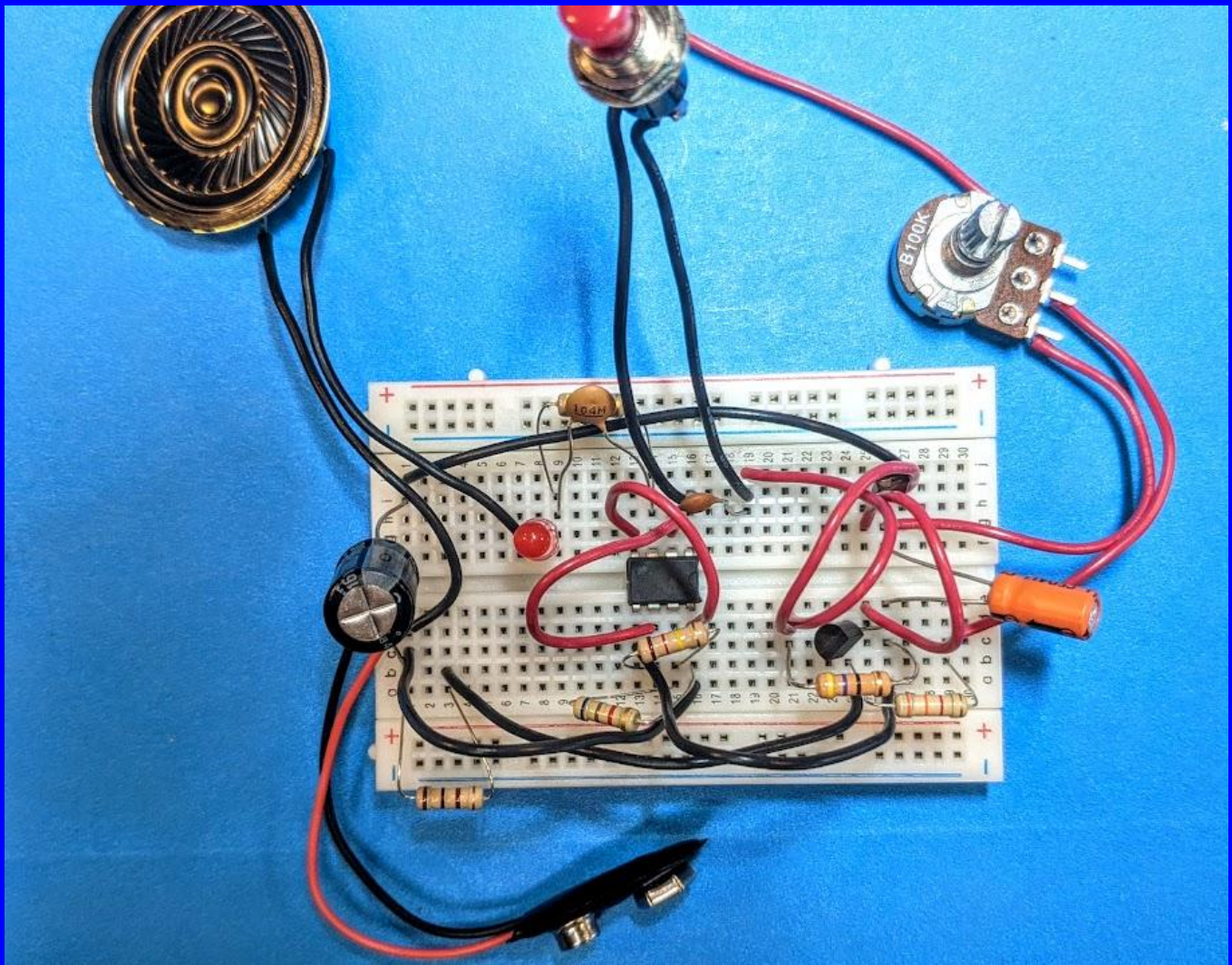
Count the right answers and record the score of right answers in your grade book.



A B C <input checked="" type="radio"/> D	#1 This circuit uses a 555 Timer IC and _____ . A. an SCR B. a variable capacitor C. a Photocell D. a two-transistor oscillator	#6 The Collector of transistor Q2 is connected to _____ of the 555 Timer IC. A. Pin 5 B. Pin 6 C. Pin 7 D. Pin 8	<input checked="" type="radio"/> A B C D
<input checked="" type="radio"/> A B C D	#2 R4 is connected to _____ . A. Pin 7 B. R7 C. C1 D. R2	#7 Switch S1 is connected to _____ . A. the positive of the battery B. resistor R6 C. the Base of transistor Q2 D. the negative of the battery	A B C <input checked="" type="radio"/> D
<input checked="" type="radio"/> A B C D	#3 On the 555 Timer _____ . A. all 8 pins are used B. all but pin 4 are used C. all but pin 5 are used D. only 6 pins are used	#8 One side of the speaker is connected directly to _____ . A. an LED B. Pin 3 on the 555 Timer IC C. Pin 7 on the 555 Timer IC D. the positive of the battery	<input checked="" type="radio"/> A B C D
A B <input checked="" type="radio"/> C D	#4 The purpose of this circuit is to _____ . A. emit a siren sound B. emit bird chirps C. emit phasor machine gun sounds D. emit crunching sounds	#9 The Anode of the LED is connected directly to _____ . A. Pin 3 B. the positive of the battery C. the negative of the battery D. Pin 7	A <input checked="" type="radio"/> B C D
A B C <input checked="" type="radio"/> D	#5 In addition to fantasy machine gun sounds what else does the circuit do? A. vibrates like a snake B. chirps like a bird C. varies the heat in the room D. emits a light effect with an LED	#10 Resistor R5 is connected across _____ . A. pins 6 and 7 of the 555 Timer IC B. the speaker C. the power supply circuit D. output circuit	<input checked="" type="radio"/> A B C D

BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE-ELECTRONICS

FANTASY SPACE MACHINE GUN

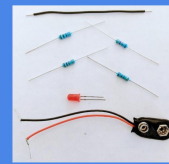
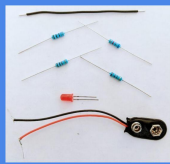


BASIC ELECTRONICS LAB 1

“FANTASY SPACE MACHINE GUN CIRCUIT”

(Poster MC1-29-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