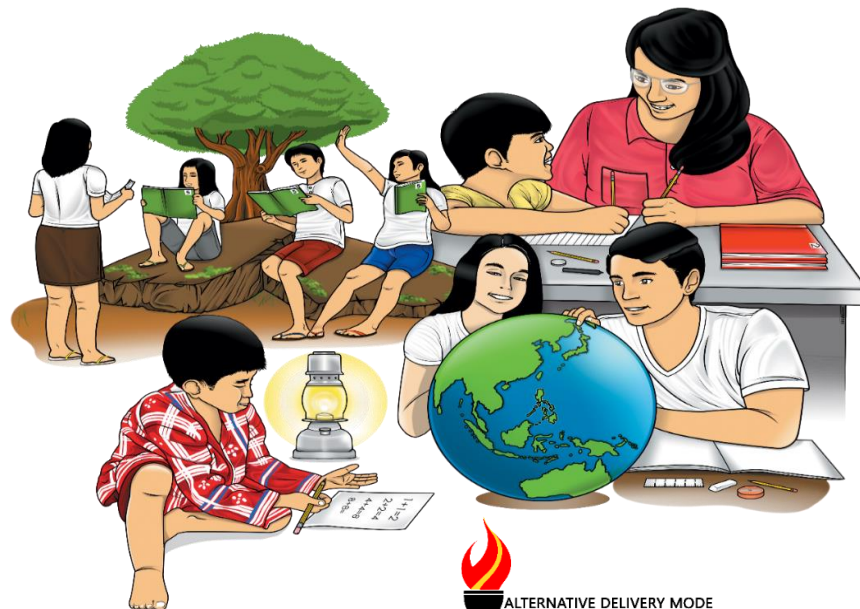


Special Program in Technical Vocational Education

Quarter 1 – Module 8 Testing and Repairing Wiring/Lighting System (Installing wiring/lighting system)

Automotive Servicing NC II



10

Special Program in Technical Vocational Education

**Quarter 1 – Module 8
Testing and Repairing
Wiring/Lighting System**
(Installing Wiring/Lighting System)
Automotive Servicing NC II

IA-Automotive Servicing NCI – Grade 10
Alternative Delivery Mode
Quarter 1 – Module 8. Installing Wiring/Lighting System

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Introductory Message

This Self-Learning Module (SLM) is prepared so that you, our dear learners, can continue your studies and learn while at home. Activities, questions, directions, exercises, and discussions are carefully stated for you to understand each lesson.

Each SLMS is composed of different parts. Each part shall guide you step-by-step as you discover and understand the lesson prepared for you.

Pre-tests are provided to measure your prior knowledge on lessons in each SLM. This will tell you if you need to proceed on completing this module or if you need to ask your facilitator or your teacher's assistance for better understanding of the lesson. At the end of each module, you need to answer the post-test to self-check your learning. Answer keys are provided for each activity and test. We trust that you will be honest in using these.

In addition to the material in the main text, Notes to the Teacher are also provided to our facilitators and parents for strategies and reminders on how they can best help you on your home-based learning.

Please use this module with care. Do not put unnecessary marks on any part of this SLM. Use a separate sheet of paper in answering the exercises and test. And read the instructions carefully before performing each task.

If you have questions in using this SLM or any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator.

Thank you.



Notes to the Teacher

This contains helpful tips or strategies that will help you in guiding the learner.











For the facilitator:

Hi, as a facilitator you are expected to orient the learners on how to use this module. You also need to keep track of the learners' progress while allowing them to manage their own learning. Kindly, advise the learner's parents or guardians of the same procedure since they will be the primary supporters in the learners' progress. Please, do not forget to remind the learner to use separate sheets in answering all of the activities found in the learning module

For the learner:

Hello learner, Welcome to the Automotive Servicing NC II Alternative Delivery Mode (ADM) Module on Installing Wiring/Lighting System. We hope you are ready to progress in your Grade 10 SPTVE in automotive servicing with this learning module. This is designed to provide you with interactive tasks to further develop the desired learning competencies prescribed in our curriculum. With this, you are expected to appreciate staking through the information and activity given.

This module has the following parts and corresponding icons:

ICON	LABEL	DETAIL
	What I Need to Know	This contains the learning objectives which you need to accomplish.
	What I Know	This evaluates what you know about the lesson you are to learn.
	What's In	This connects the current lesson with a topic necessary in your understanding.
	What's New	This introduces the lesson through an activity.
	What Is It	This contains a brief discussion of the learning module lesson.
	What's More	These are activities to check your understanding of the lesson.
	What I Have Learned	This summarizes the important ideas presented in the lesson.
	What I Can Do	This is a real-life application of what you have learned.
	Assessment	This is a post assessment of what you have learned.
	Additional Activity	This is an activity that will strengthen your knowledge about the lesson.

At the end of this module, you will also find:

References

This is a list of all sources used in developing this module.

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LESSON

8

Applying Basic Safety Procedure

The following are some reminders in using this module:

1. Use the module with care. Do not put unnecessary mark/s on any part of the module. Use a separate sheet of paper in answering the exercises.
2. Don't forget to answer *What I Know* before moving on to the other activities included in the module.
3. Read the instruction carefully before doing each task.
4. Observe honesty and integrity in doing the tasks and checking your answers.
5. Finish the task at hand before proceeding to the next.
6. Return this module to your teacher/facilitator once you are through with it.

If you encounter any difficulty in answering the tasks in this module, do not hesitate to consult your teacher or facilitator. Always bear in mind that you are not alone.

We hope that through this material, you will experience meaningful learning and gain deep understanding of the relevant competencies. You can do it!



What I Need to Know

This module was designed and written to guide you to acquire the learning competencies and develop your skills in applying basic safety procedure. The scope of this module permits it to be used in many different learning situations. The language used recognizes the diverse vocabulary level of students. The lessons are arranged to follow the standard sequence of the course. However, the order in which you read the module can be changed to correspond with the textbook you are now using.

Quarter/Week

Q1/8

Learning Competency Code

TLE_IAAUS9-12TRW-IIIe-g-11

Learning Competency

LO 2. Install Wiring/Lighting System.

Learning Objectives:

After going through this module, you are expected to:

1. interpret lighting system circuit diagram;
2. draw and connect different lighting system circuits, and;
3. recognize the possible advantages in knowing how to interpret and install lighting connections.



What I Know

Pre-Test/Assessment

I-Multiple Choice

Direction: Choose the LETTER of the best answer and write in the answer sheet.

1. Switch that is used in a back-up light circuit that switches the back-up light when transmission is shifted in reverse.
 - a. back-up light switch
 - b. directional light switch
 - c. headlight switch
 - d. park lights
2. Headlight is a _____ connection.
 - a. controlled
 - b. not controlled
 - c. unknown
 - d. none of the above
3. The circuits in the vehicle include all, except what?
 - a. battery
 - b. lamps
 - c. switch
 - d. none of the above
4. The components of horn circuit are the following except?
 - a. battery
 - b. bulb
 - c. fuse
 - d. relay
5. Where does the stop light switch installed?
 - a. brake pedal
 - b. engine
 - c. steering column
 - d. transmission
6. The terminal of the Bosch relay are _____?
 - a. terminal 30, 85, 86 & 87
 - b. terminal 30, 80, 86 & 87
 - c. both a & b
 - d. none of these
7. If you shift the transmission into reverse position, what happen to the rear light?
 - a. back-up light will switch on
 - b. signal light will switch on
 - c. stop light will switch on
 - d. tail light will switch on
8. A switch that is used in the brake light circuit?
 - a. back-up light switch
 - b. signal light switch
 - c. stop light switch
 - d. tail light switch
9. In horn circuit, what do we call the switch that is operated by the driver to apply horn?
 - a. back-up light switch
 - b. horn switch
 - c. stop light switch
 - d. tail light switch

10. The type of circuit connection that is obsolete but still can be seen in some old vehicles.

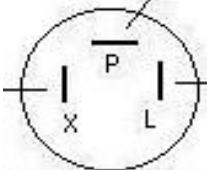
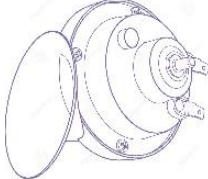
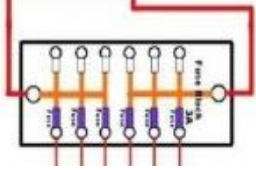

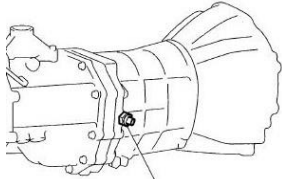
- a. conventional
- b. steering column
- c. both A and B
- d. none of the above

II- Identification

Directions: For numbers 11-15, identify what type of circuit diagram that each component belongs? Choose from the following;

- A. Back-up Light Circuit
- B. Horn Circuit
- C. Signal and Hazard Circuit
- D. All electrical circuit

Write your answer in the answer sheet. Answers may be repeated.

11.	
12.	
13.	
14.	
15.	



What's In

Word Search

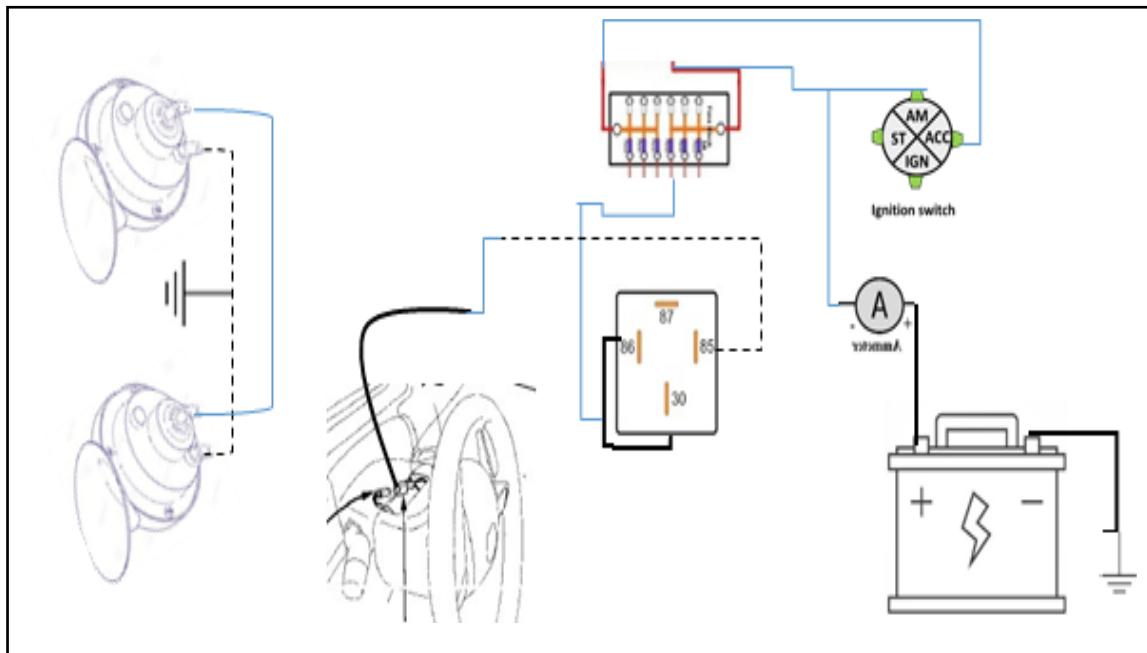
Directions: Look for the 5 words that are related to wiring system. Write your answer in the answer sheet.

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



What's New

Direction: Describe what was the illustration all about?

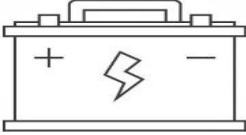
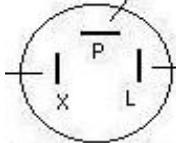

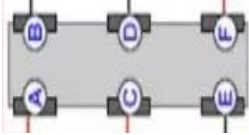

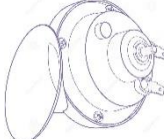
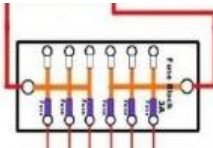
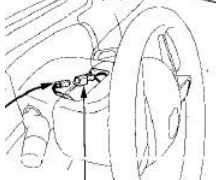
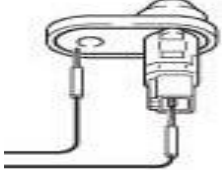
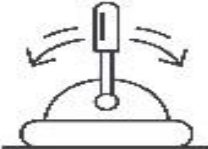
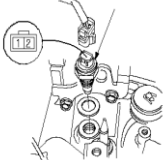





What Is It

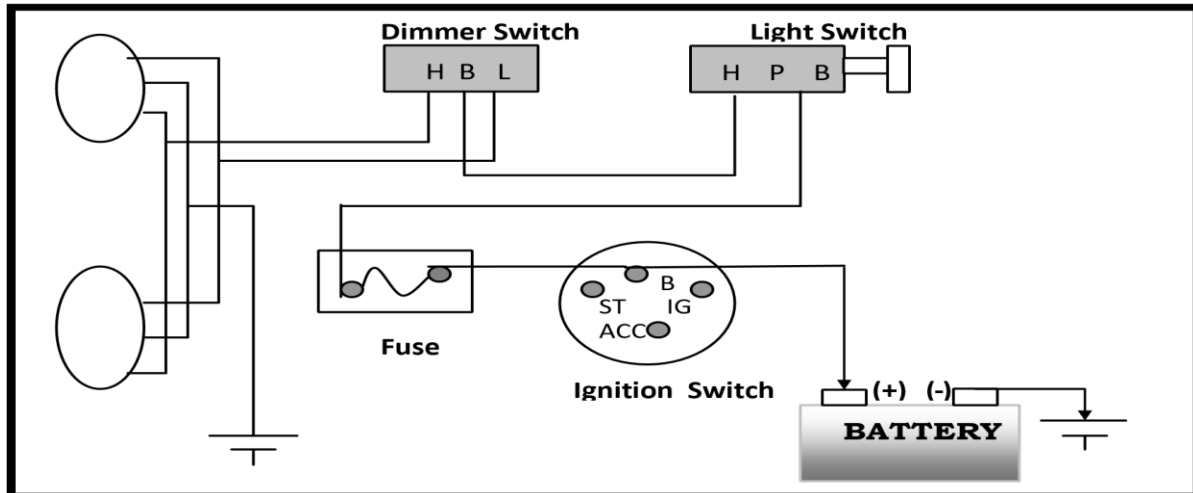
INTERPRETING LIGHTING AND WARNING CIRCUIT DIAGRAM

Before proceeding to the different automotive lighting circuits, familiarize first the following pictures or symbols for it easy interpretation/ understanding of the topic.

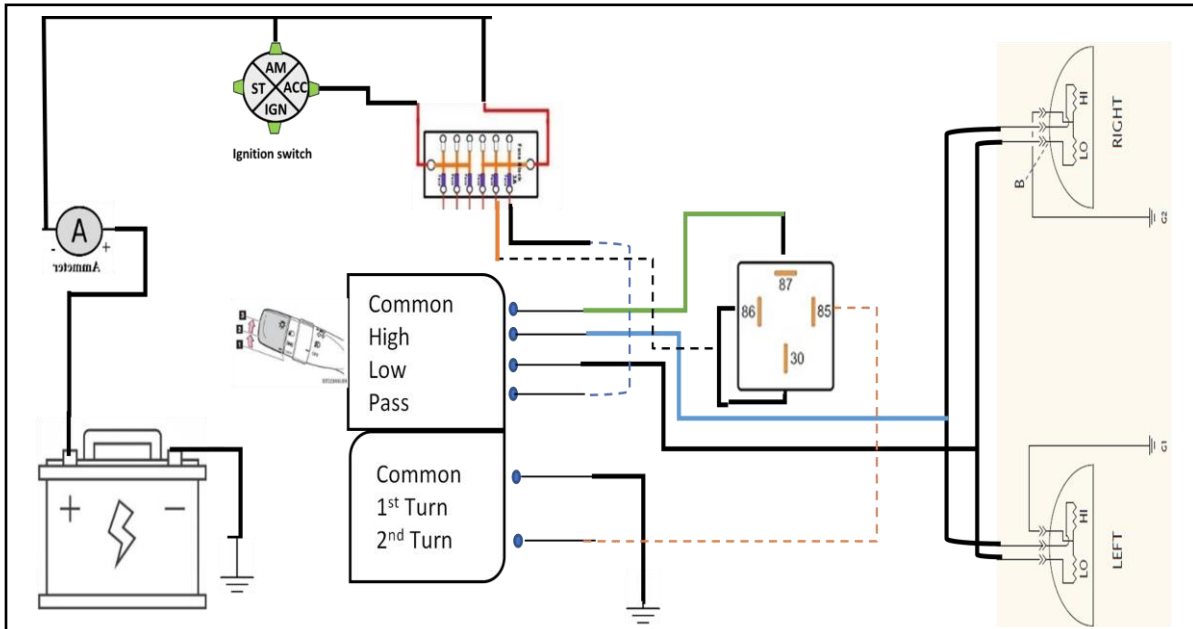
1.	 <p>Battery</p>	 <p>Flasher Relay</p>
2.	 <p>Ammeter</p>	 <p>Hazard Switch</p>
3.	 <p>Ignition switch Ignition Switch</p>	 <p>Horn</p>
4.	 <p>Fuse Box with fuses</p>	 <p>Horn Switch</p>
	 <p>Courtesy light switch</p>	 <p>Dome light switch</p>
	 <p>Back-up light switch</p>	 <p>Ground</p>

Introduction

Lighting system circuit diagram has two types, the conventional type which was used by the ancient vehicles and the steering column switch type that is now being used in modern vehicles. Their difference is that steering column switch type is easy to operate unlike in conventional type.



Example of Conventional Type Switch used in Headlight Circuit

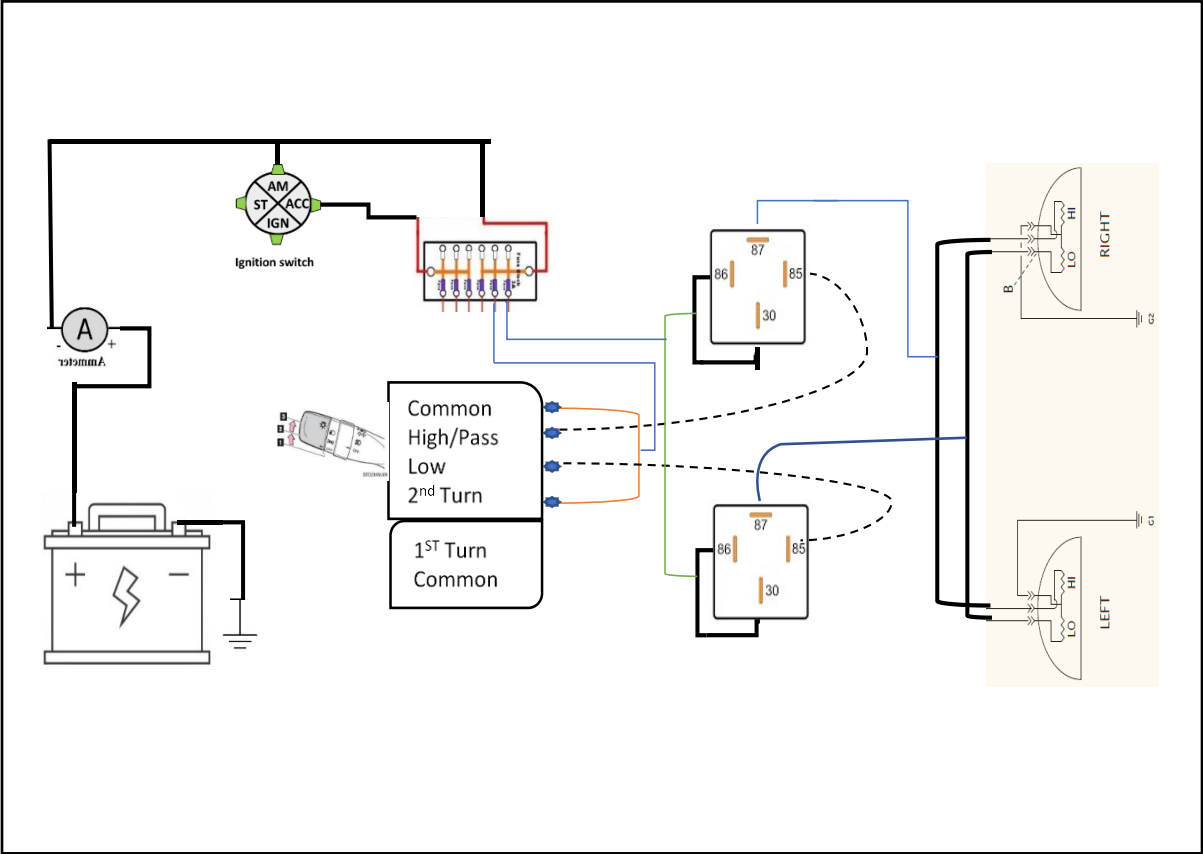


Example of Steering Column Type Switch used in Headlight Circuit

1. HEADLIGHT CIRCUIT

Headlight circuit is basically consisting of a battery, ammeter, ignition switch, fuse box with fuses, headlight control switch, bosch relay, headlamp and related wirings.

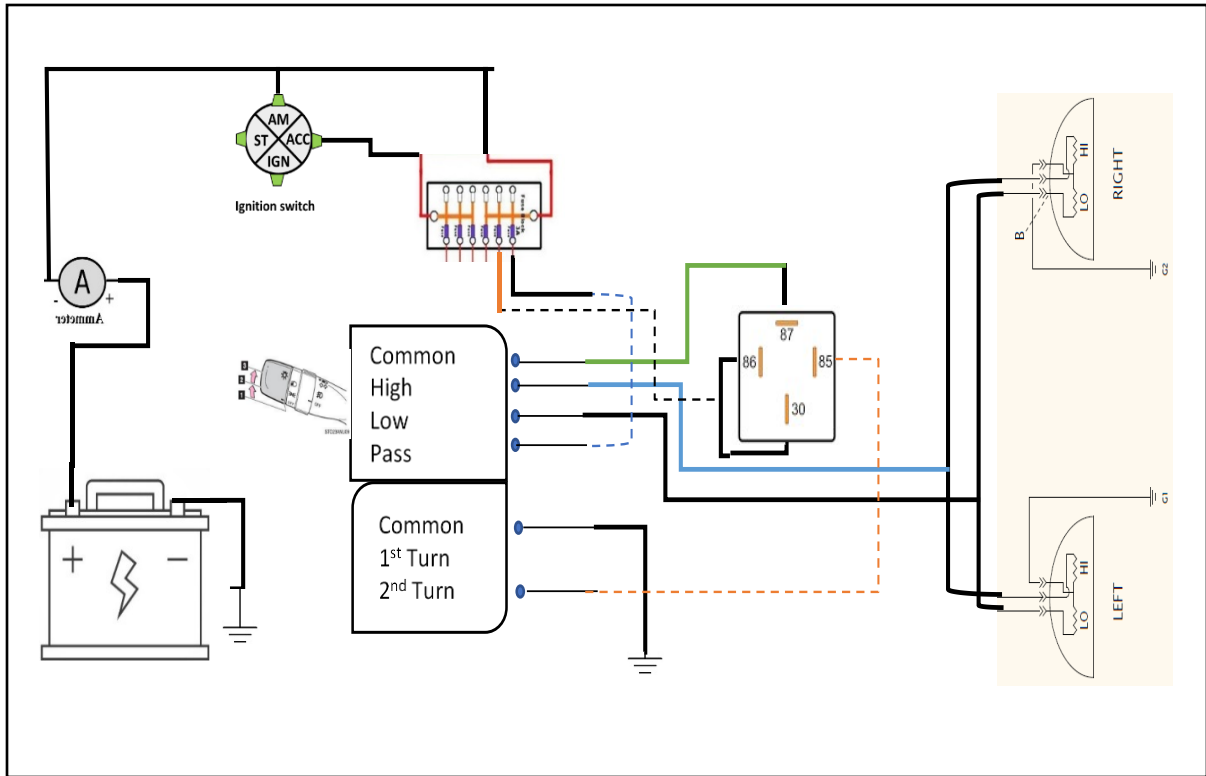
Depending on the brand of the vehicle, headlight circuit diagram may have different wiring connection. If not sure on the connection of the headlight, you may refer on the following diagram below but headlight terminals must be first identified.



Pictorial diagram of a headlight circuit

NOTE: This type of connection is used when the following terminals are combined when being tested using a test lamp;

- 2nd turn, low, high/pass has a common source or supply.
 - High and pass is combined.
- Headlight is a not controlled connection meaning, headlight may be turned or switched on even the ignition key is in lock position.



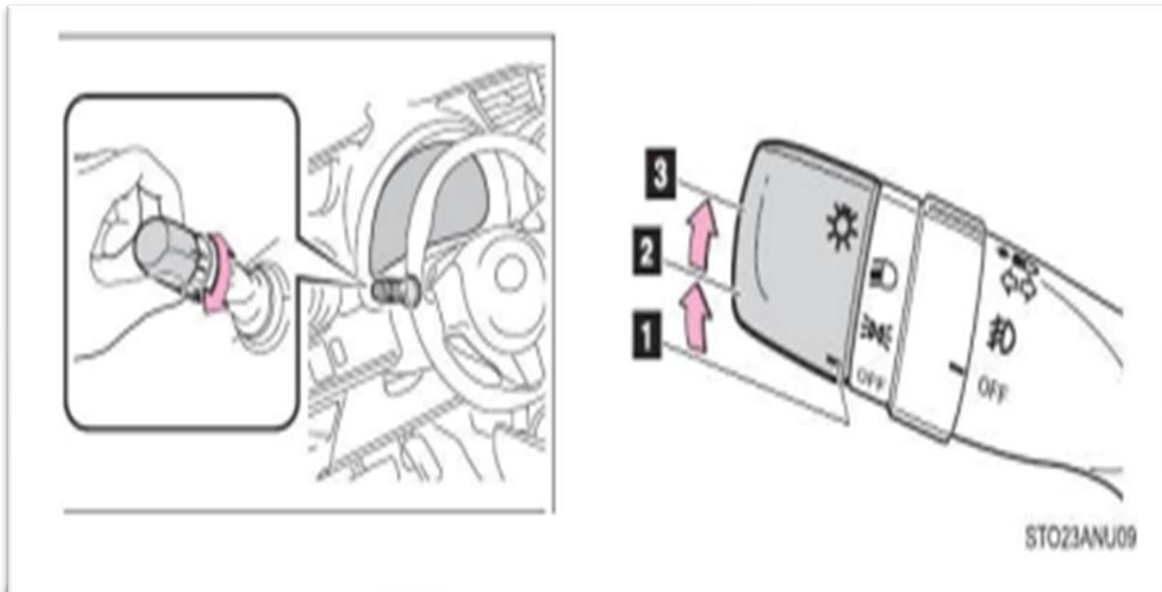
Pictorial diagram of headlight circuit

NOTE: This type of connection is used when the following terminals are combined when being tested using a test lamp;

- high, low and pass terminals has a common source or supply.
- 1st turn and 2nd turn has a common source or supply.

You may also add separated bosch relays for the high and low lamps.

Use of Headlamp Switch in a Steering Column Type Switch



1 OFF

The side marker, parking, tail, license plate, panel board, headlight turn off

2 

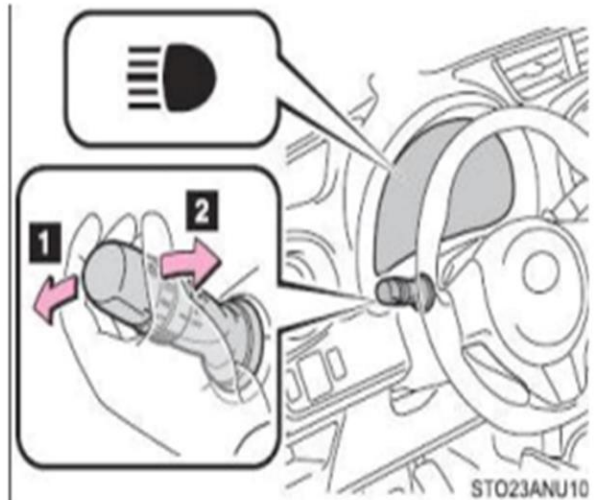
The side marker, parking, tail, license plate, daytime running lights (if equipped) and instrument panel lights turn on

3 

The headlights and all lights listed above (except daytime running lights) turn on.

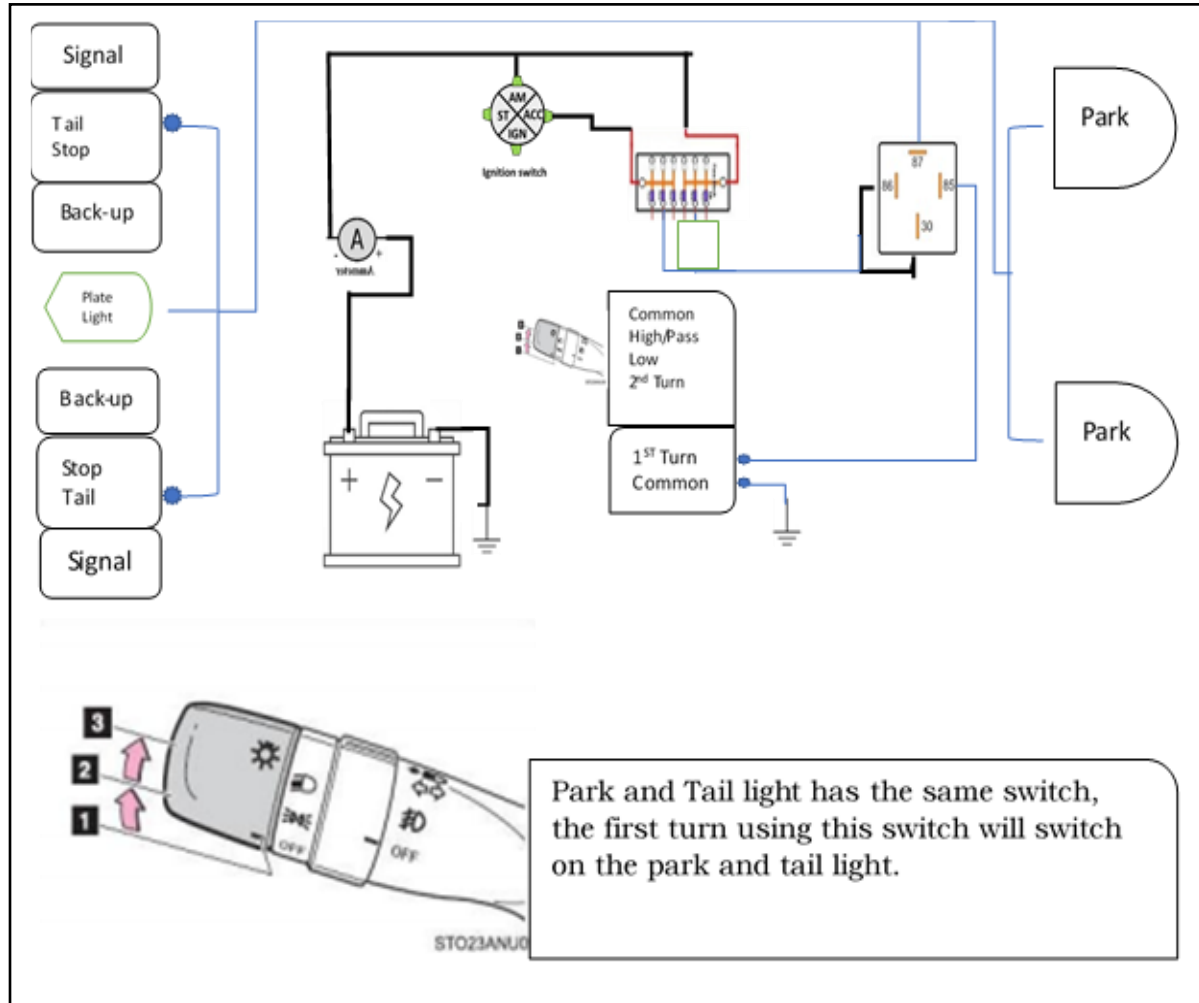
Turning high beam, low beam, beam passes headlights

- Center position - low beam
- Downward position - high beam
- Upward position - beam pass



2. PARK, TAIL, AND LICENSE PLATE LIGHT CIRCUIT

Park and tail light circuit is basically consisting of a battery, ammeter, ignition switch, fuse box with fuses, park and tail light switch, relays, park lamp, tail lamp, license plate lamp and related wirings.



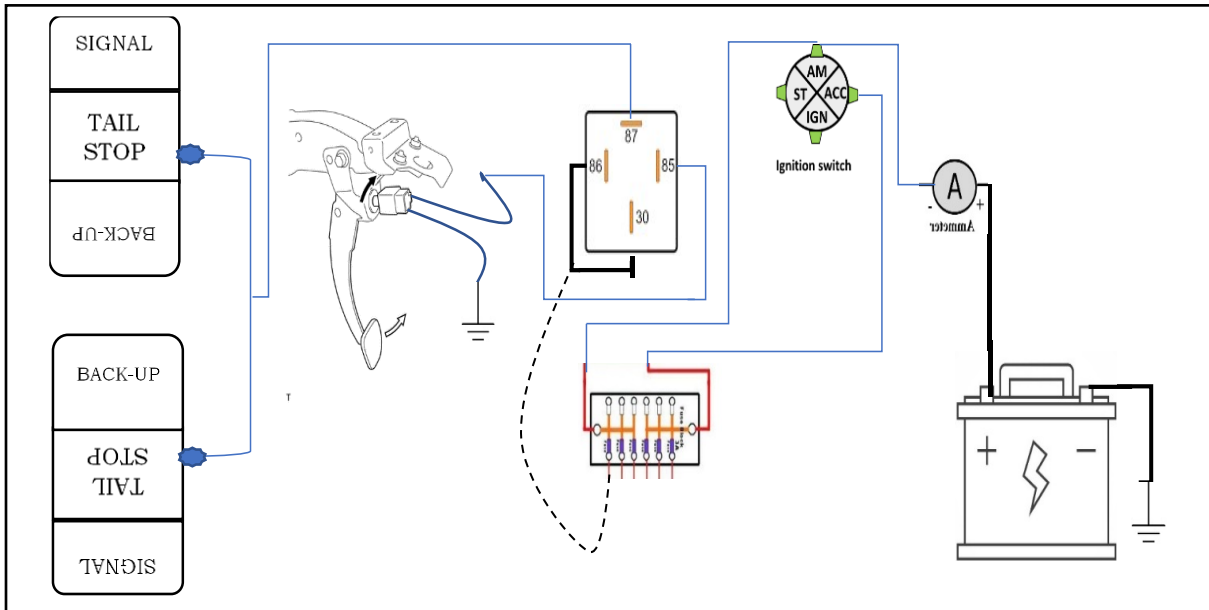
Pictorial diagram of Park and Tail Light

Note:

- Assuming that park and tail lamp is automatically grounded.
- Park, tail and plate lamp is a Controlled Connection meaning, once the ignition key is in lock position these lamps won't illuminate even though the control switch is being turned or switched on.

3. BRAKE/STOP LIGHT CIRCUIT

Brake circuit is basically consisting of a battery, ammeter, ignition switch, fuse box with fuses, brake light switch, relay, brake lamp and related wirings.



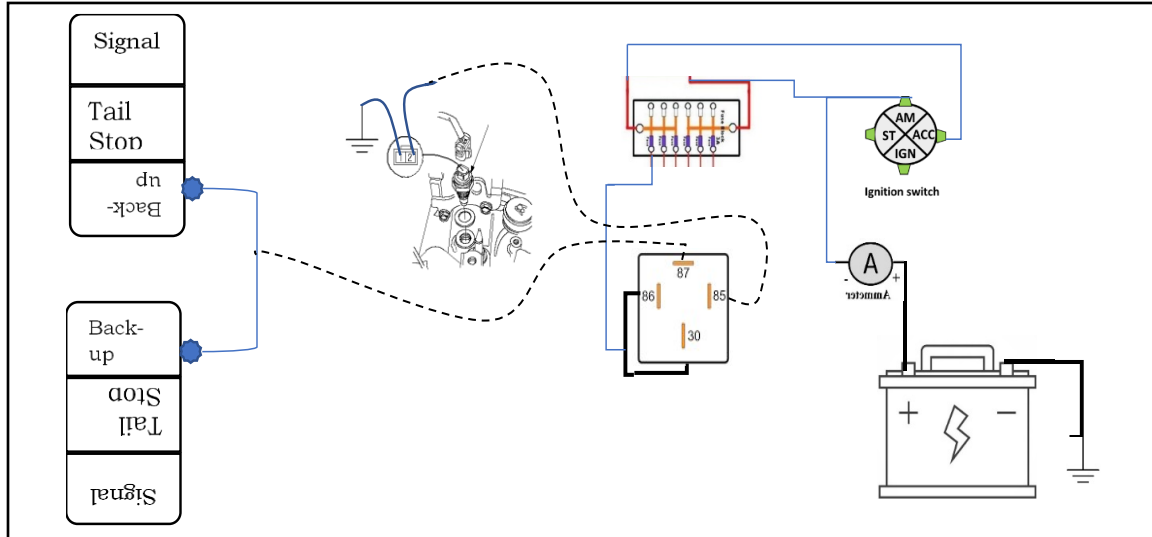
Pictorial Diagram of Stop/Brake Light Circuit

Note:

- Assuming that stop light is automatically grounded.
- Brake/Stop light is a not controlled connection.

4. BACK-UP LIGHT CIRCUIT

Back-up light circuit is basically consisting of a battery, ammeter, ignition switch, fuse box with fuses, bosch relay, back-up light switch, back-up lamp and related wirings.



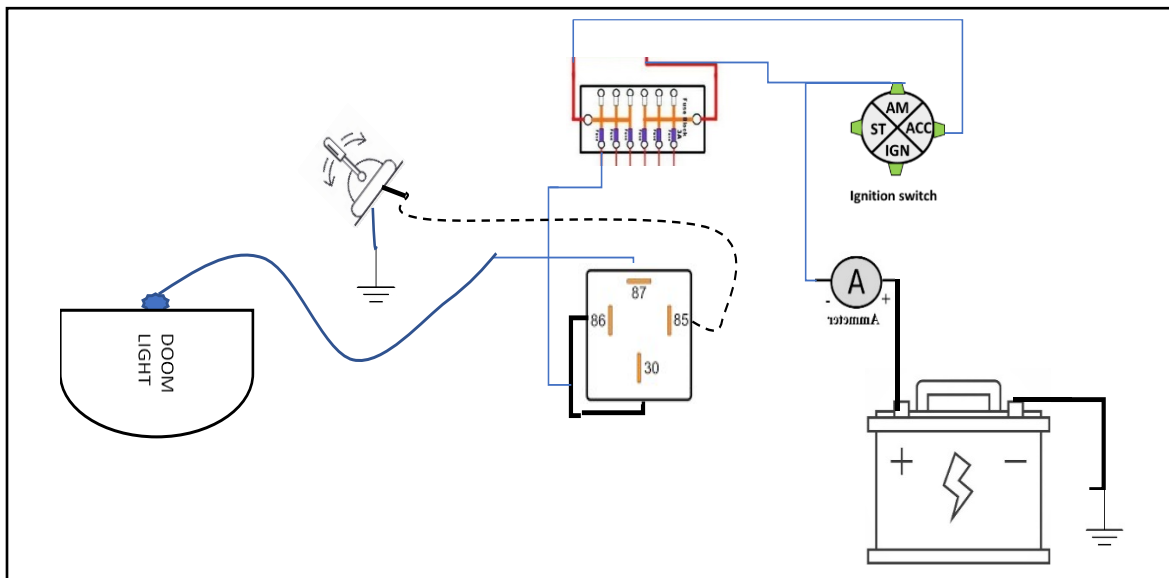
Pictorial diagram of back-up light circuit.

Note:

- Assuming that back-up lamp is automatically grounded.
- Back-up light is a controlled connection.

5. DOME LIGHT

Dome light circuit is basically consisting of a battery, ammeter, ignition switch, fuse box with fuses, bosch relay, dome light switch, dome lamp and related wirings.



Pictorial diagram of dome light circuit.

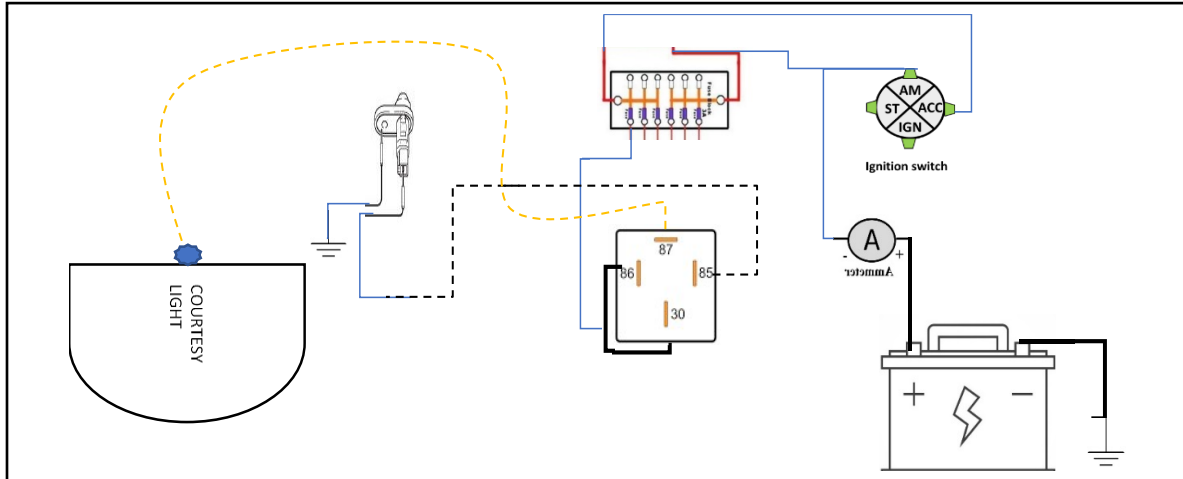
Note:

- Dome light is automatically grounded

- Dome light is a not controlled connection

6. COURTESY LIGHT CIRCUIT

Courtesy light circuit is basically consisting of a battery, ammeter, ignition switch, fuse box with fuses, bosch relay, courtesy light switch, courtesy lamp and related wirings.



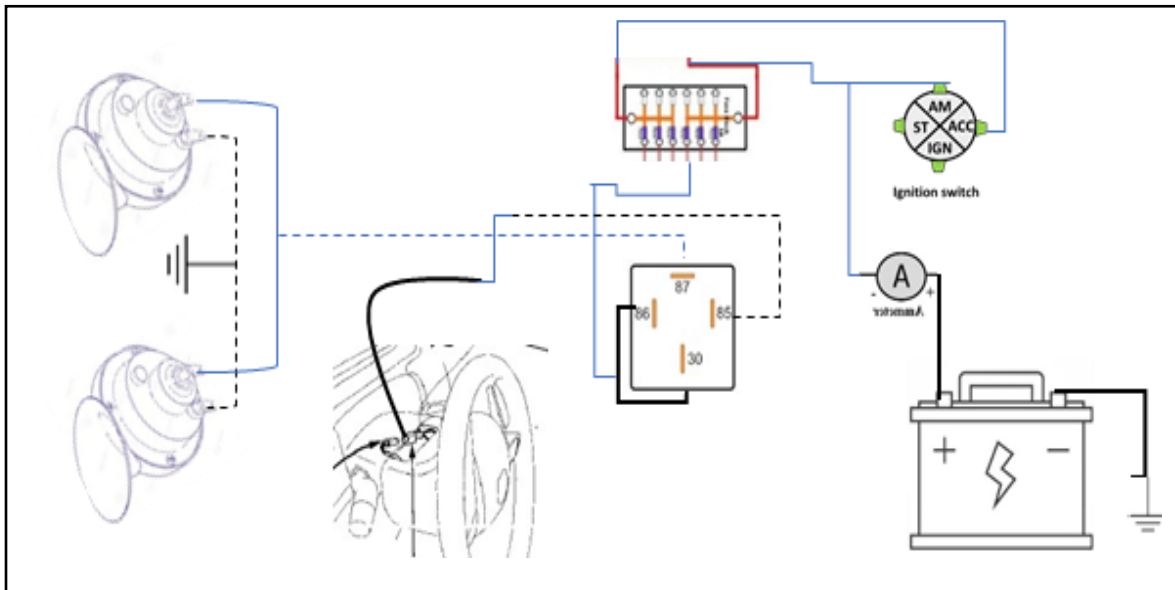
Pictorial diagram of a courtesy light circuit.

Note:

- Assuming that courtesy light is automatically grounded.
- Courtesy light is a not controlled connection.

7. HORN CIRCUIT

Horn circuit is basically consisting of a battery, ammeter, ignition switch, fuse box with fuses, relay, horn switch, horns and related wirings.



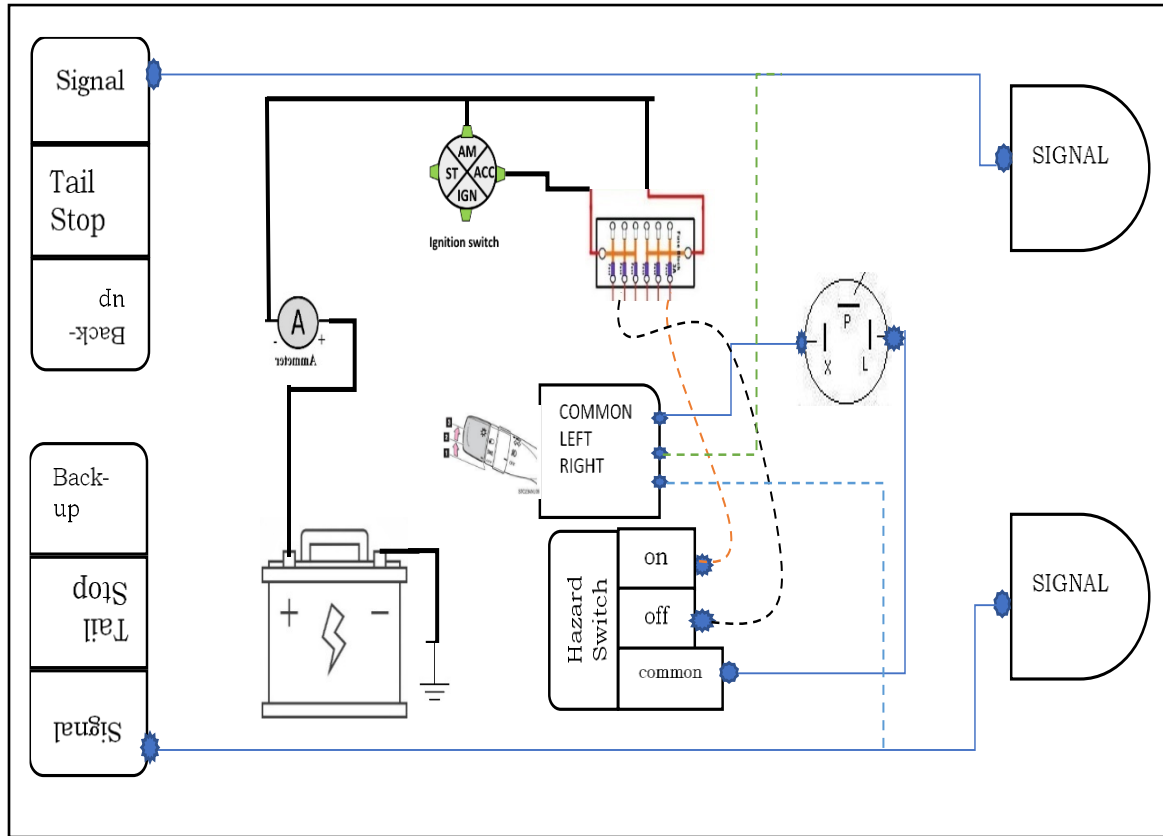
Pictorial diagram of a horn circuit.

Note: Horn is a not controlled connection.

8. HAZARD AND SIGNAL LIGHT CIRCUIT

Hazard and signal circuit is basically consisting of a battery, ammeter, ignition switch, fuse box with fuses, hazard switch, signal switch, flasher relay, turn signal bulbs, indicator bulbs and related wirings.

DIAGRAM 1

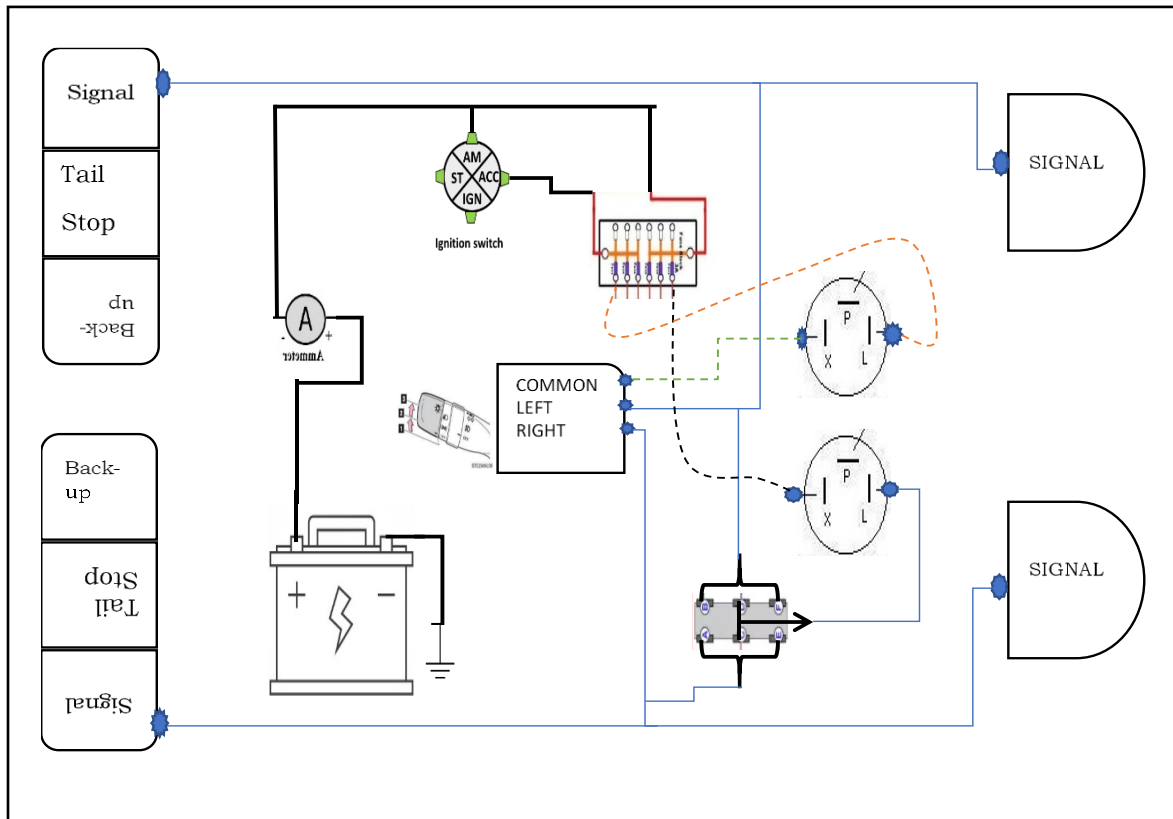


Pictorial diagram of signal and hazard circuit connection.

Note:

- This kind of signal and hazard circuit connection is used when hazard switch is attached into the steering column with the following terminals- ON, OFF and common source or supply of ON and OFF, when being tested using a test lamp.
- Single flasher.
- Assuming that signal lamps are automatically grounded.
- Turn signal indicator was not included in the diagram
- Turn signal light is a controlled connection while hazard light is a not controlled connection.

DIAGRAM 2



Pictorial diagram of signal and hazard circuit connection.

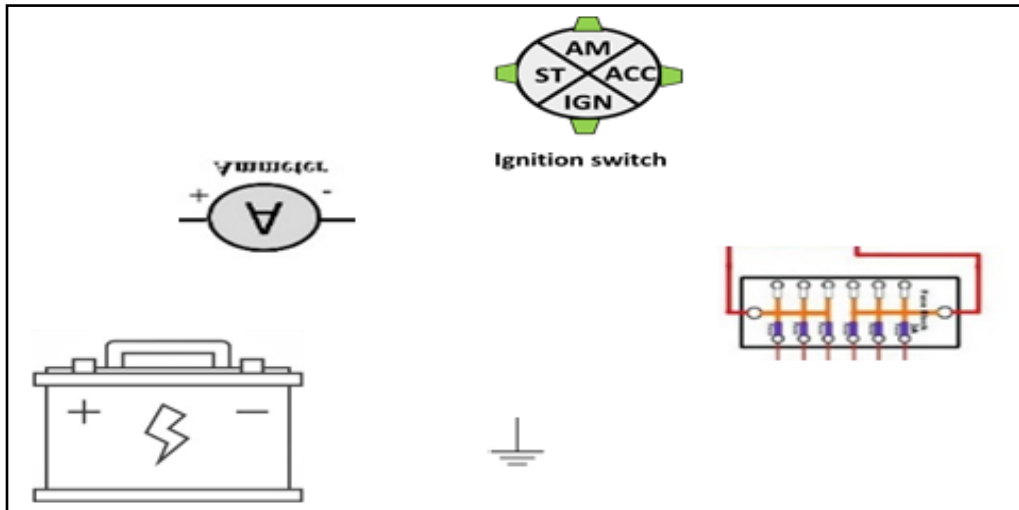
Note:

- This kind of signal and hazard circuit connection is used when using a toggle hazard switch.
- Double flasher
- Assuming that signal lamp is automatically grounded.
- Turn signal indicator was not included in the diagram
- Turn signal light is a controlled connection while hazard light is a not controlled connection.



What's More

Directions: Draw and connect the given circuit. Write your answer in the answer.



What I Have Learned

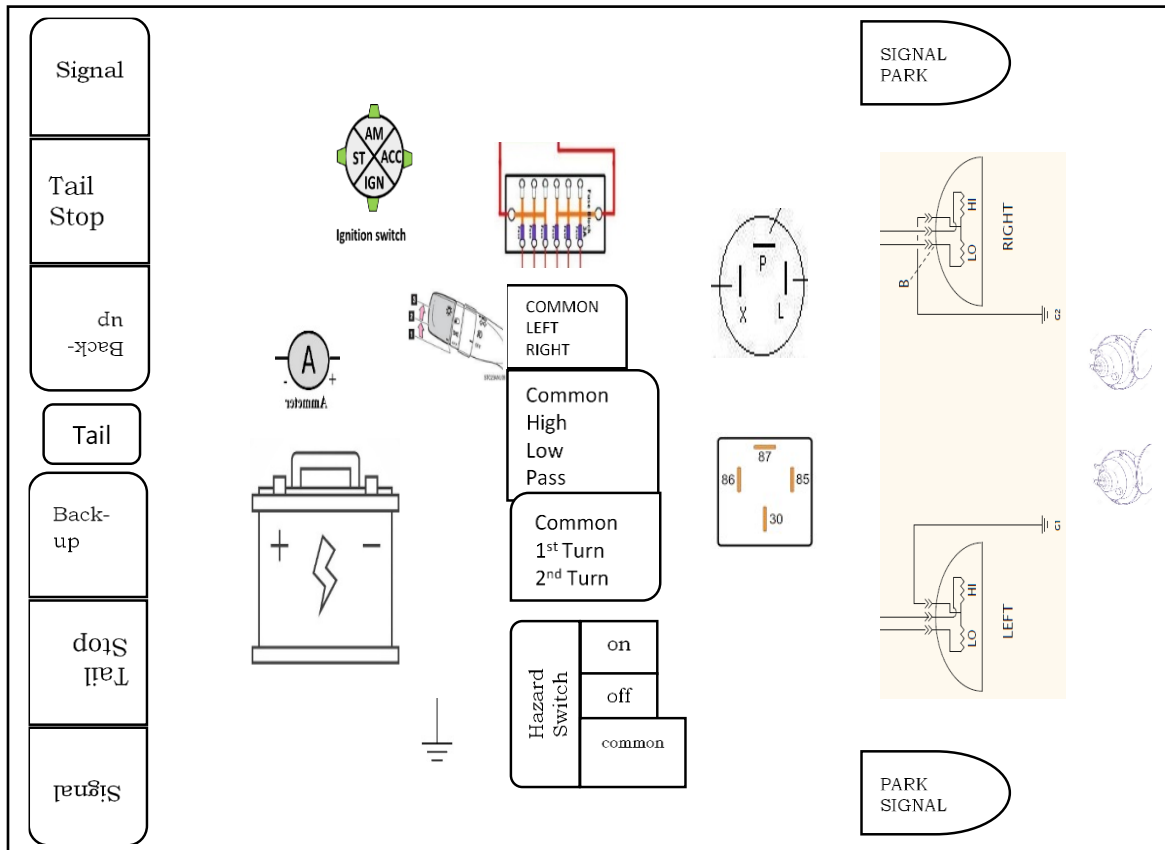
Directions: Answer the following questions in the answer sheet.

1. As a car owner/to be, what are the advantages you have if you know how to interpret and install different lighting connection?



What I Can Do

Direction: Copy and connect the different electrical circuit of a vehicle except doom, courtesy, side marker, stop, and back-up light circuit. Answer the following questions in the answer sheet.



Single relay and flasher.



Post-Assessment

I-Multiple Choice

Direction: Choose the LETTER of the best answer and write in the answer sheet.

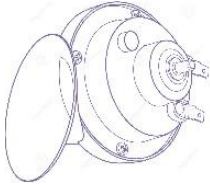
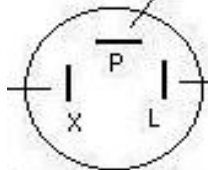
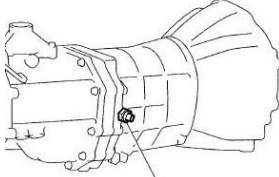

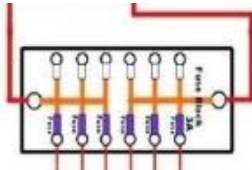
1. The type of circuit connection that is obsolete but still can be seen in some old vehicles.
 - a. conventional
 - b. steering column
 - c. both A and B
 - d. none of the above
2. The terminal of the Bosch relay are _____?
 - a. terminal 30, 85, 86 & 87
 - b. terminal 30, 80, 86 & 87
 - c. both a & b
 - d. none of these
3. Switch that is used in a back-up light circuit that switches the back-up light when transmission is shifted in reverse.
 - a. back-up light switch
 - b. directional light switch
 - c. headlight switch
 - d. park lights
4. Headlight is a _____ connection.
 - a. controlled
 - b. not controlled
 - c. unknown
 - d. none of the above
5. The circuits in the vehicle include all, except---
 - a. battery
 - b. lamps
 - c. switch
 - d. none of the above
6. The components of horn circuit are the following except?
 - a. battery
 - b. bulb
 - c. fuse
 - d. relay
7. Where does the stop light switch installed?
 - a. brake pedal
 - b. engine
 - c. steering column
 - d. transmission
8. If you shift the transmission into reverse position, what happen to the rear light?
 - a. back-up light will switch on
 - b. signal light will switch on
 - c. stop light will switch on
 - d. tail light will switch on
9. A switch that is used in the brake light circuit?
 - a. back-up light switch
 - b. signal light switch
 - c. stop light switch
 - d. tail light switch
10. In horn circuit, what do we call the switch that is operated by the driver to apply horn?
 - a. back-up light switch
 - b. horn switch
 - c. stop light switch
 - d. tail light switch

II- Identification

Directions: For numbers 11-15, identify what type of circuit diagram that each component belongs? Choose from the following;

- A. Back-up Light Circuit
- B. Horn Circuit
- C. Signal and Hazard Circuit
- D. All electrical circuit

Write your answer in the answer sheet. Answers may be repeated.

11.	
12.	
13.	
14.	
15.	



Additional Activity

Direction: Enumerate what is being asked in the following questions. Write in the answer sheet.

1. List all the electrical components or accessories consisting stop light circuit.
2. List all the electrical components or accessories consisting reverse light circuit.
3. List all the electrical components or accessories consisting doom light circuit.
4. List all the electrical components or accessories consisting courtesy light circuit.



Answer Key

What I Know

- 15. A
- 14. D
- 13. D
- 12. B
- 11. C
- 10. A
- 9. B
- 8. C
- 7. A
- 6. A
- 5. A
- 4. B
- 3. D
- 2. B
- 1. A

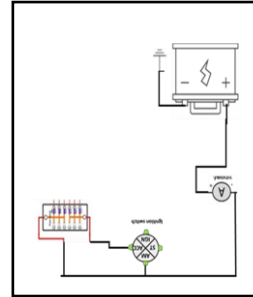
What's In

- 1. HAZARD SWITCH
- 2. FLASHER
- 3. FUSE
- 4. BATTERY
- 5. SIGNAL LIGHT SWITCH

What's New

It is a wiring diagram specifically for horn circuit.

What's More



What I Have Learned

Answers may vary

What I Can Do

Refer to the next page.

Post Assessment

- 15. D
- 14. D
- 13. A
- 12. C
- 11. B
- 10. B
- 9. C
- 8. A
- 7. A
- 6. B
- 5. D
- 4. B
- 3. A
- 2. A
- 1. A

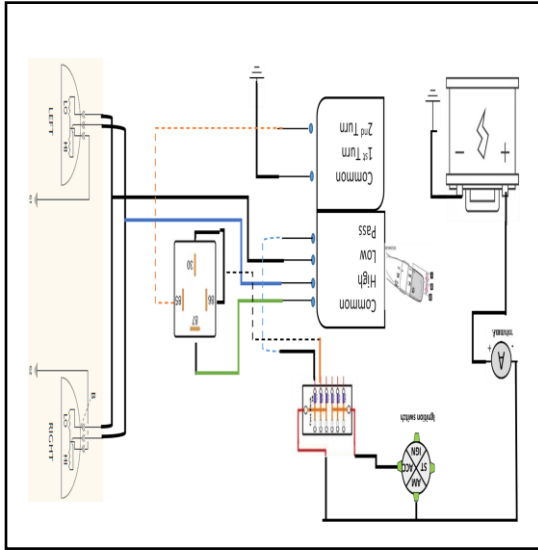
Additional Activities

All the four circuit has the following-battery, ammeter, ignition switch, fuse box with fuses and related wirings.

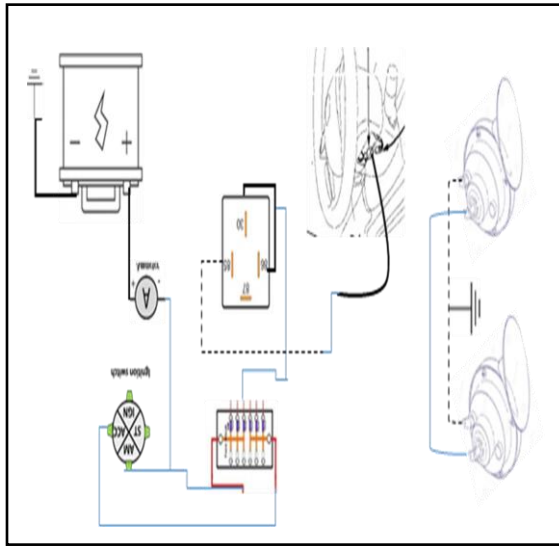
- 1. Stop light: stop light switch, relay and stop lamp.
- 2. Back-up light: back-up light switch, relay, and back-up lamp
- 3. Doom Light: doom light switch, relay and doom lamp.
- 4. Courtesy Light: courtesy light switch, relay and courtesy lamp

What I Can Do

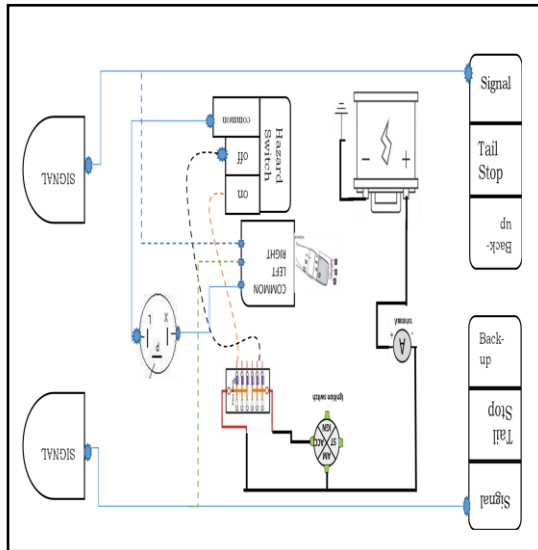
For the headlight connection



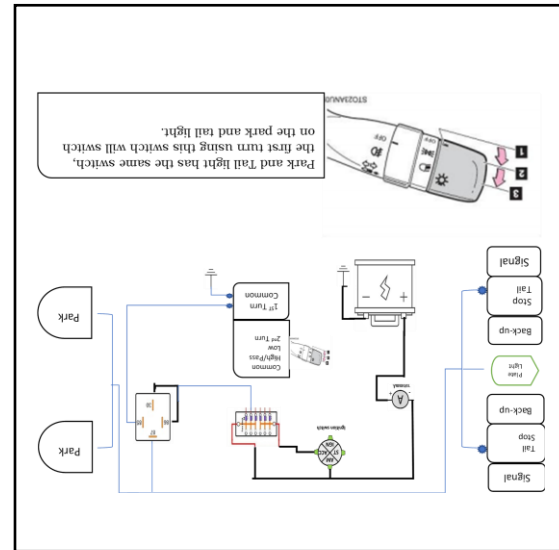
For the Horn Circuit connection



For the Signal and Hazard Circuit connection



For the Park and Tail Circuit connection



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