

Improvement of Electrical Circuit Simulation of Wipper System

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ABSTRACT

The wiper system is electrical system body which function as a windshield sweeper with the main goal is keeping the driver's view when the weather is dewy or rainy, the wiper system has 2 electrical circuits namely high speed and low speed plus a washer circuit that functions to spray liquid onto the glass. Because the wiper system electrical circuit simulation trainer is no longer functioning, in this final project the writer fixes, the wiper system electrical circuit simulation in the automotive lab to function again. The writer repairs the wiper system electrical circuit simulation so that it can be used again in practice, so that students can easier to understand how paths of the electrical circuits in the wiper system such as high speed and low speed circuit and washer system circuits. From the result of the electrical circuit simulation repairing of the wiper system, there are components that are missing and damaged, so some components must be replaced. In the wiper system at high speed. It requires a larger supply of electric current than at low speed.

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INTRODUCTION

Automotive technology is one of the fields whose technological development always follows the demands of the times, the development of automotive technology is based on three main things, namely comfort, security and safety. A car can be said to be good if it provides three main things, one of the systems that make a vehicle more comfortable is also as a safety support is the existence of an electrical system body, the body electrical system is all electrical installations located on the vehicle body, this system functions as an additional component to complete the functionality of a car, it can be said, body electricity This does not have any effect on vehicle performance but greatly supports driving safety. So that with the presence of electricity, the car body can function safely and comfortably.

The system in body electricity is divided into several parts such as the lighting system, wiper and washer systems, and many other systems. On this occasion, the author will discuss one of the systems found in body electricity, namely the wiper system simulation series. Wipers are an important tool for sweeping rainwater, and items that settle on the surface of the front and rear glass to maintain the driver's vision The wiper consists of a wiper blade, a wiper arm, a wiper motor, and a wiper link that are interconnected. (washer) that emits liquid (washer liquid) onto the glass.

The wiper and washer motor is one of the most important components to support the operation of the wiper and washer system on the vehicle body electrical. Of course, there are requirements to make wiper and washer motors work well, namely the need for appropriate current in wiper and washer motors. (Khairul umam, 2019:1)

THEORETICAL FOUNDATIONS AND FRAMEWORK OF THOUGHT

The wiper system is one of the devices that is a mechanism in car vehicles that is very important, especially when the car is driving in the rain or in the morning and it is still dewy and foggy.

Wipers are one of the important components in the car and are closely related to safety. Wipers function to ensure that the driver's view is not obstructed by rainwater or small animals attached to the glass. (Gunadi,2008: 47)

The history of wipers began when Mary Anderson, a real estate entrepreneur as well as cattle rancher and winemaker, was riding a streetcar in New York City during a storm in 1903. Anderson noticed that tram operators were struggling to cope with poor visibility. In order to get better vision, the operator had to open the window and stick his head out.

Anderson began to gradually develop a design for windshield wipers that could be operated by the driver. This manual mechanism operated a set of wooden and rubber arms with levers to help clear snow, rain and dirt, at that time anderson's invention was still a mediocre response by investors, it was not until 1916 that windshield wipers became standard equipment in most vehicles allowing further advances in technology.

William M. Folberth, an inventor patented the first non-hand-driven automatic windshield wiper in 1919. This automatic windshield wiper uses a vacuum-powered system to clean the windshield, which is standard equipment on cars. These vacuum-powered systems were widely used until the 1960s when the use of intermittent wipers became more common. Currently, wipers are used in various types of vehicles. (<http://otomotif.kompas.com/>).

Given the importance of the wiper system in a vehicle, when processing the installation of the wiring diagram must be very well considered, the use of fuses must also be in accordance with the load required to maintain the safety of the existing electrical system.

Types of Wipers.

The progress and development of technology today is very rapid and there are a lot of inventions that help to perfect a technology, one of which is in the automotive field there are many types of types that have emerged, including in the series of wiper systems this has many types.

Here are the types of types of wiper systems:

1. Tandem System

Tandem system is the most conventional configuration and is commonly used in various types of cars, this type of wiper system uses two rods with directions according to the driving position. If the car is right-hand drive, it means that the first sweep is also to the right and vice versa if it is a left hand drive, then the rubber sweeps to the left.

2. Opposed System

This type is the same as the tandem type, only in the reverse position, the wiper rubber is stacked in the middle and when moving both point to the opposite side.

3. Mono Wiper

This wiper system has only one wiper arm and the center base moves to direct the wiper blade to reach the top more. Therefore, the traces of water under the center of the glass are heart-shaped.

Mechanically, there is nothing special like ordinary wipers, but this number of wipers has three wiper blades because usually this type of wiper is used on wide cars, such as jeeps.

How the Wiper System Works

1. When the ignition switch/ignition is ON, the current of the battery that has been connected to the fuse will be passed through the ignition key to the wiper switch.
2. The wiper switch functions as a relationship regulator as well as a high speed, low speed, washer, and off wiper system regulator when the ontario key is ON, the wiper switch already has a current that will later be passed on to the wiper motor.
3. When the wiper motor which has a function as the main drive in the wiper system gets current, the wiper motor will move according to the command of the wiper switch, be it low speed or high speed, the wiper motor will move in rotation which will later be passed to the wiper link.
4. When the wiper motor moves, the wiper link will transfer power from the wiper motor to the wiper arm as well as change the rotational motion from the wiper motor to an alternating motion.
5. The wiper link moves and passes the power through the wiper arm, then the wiper blade will move to sweep the glass on the car.

METHOD

Repairing the simulation of the electrical circuit of the wiper system, there are several missing components and quite a lot of damage where many wiring lines have been broken and damaged, as well as the condition of the switch, the connecting cable of the wiper motor also has some damage. So in his analysis the author decided to replace the damaged cable and replace and repair the components of the wiper electrical system which was damaged.

In this design, the author makes a new path by imitating the old damaged path, the author replaces the damaged cable using a new cable with good quality and connects each end of the cable, in addition to that the author closes the former cable connection using insulation which is then wrapped again and tidied up. so that the wiper series works again.

RESULTS AND DISCUSSION

Wiper system inspection

The following are the results of the checks and actions that the author performed on the components of the old wiper system:

Table 4.1. Inspection and action on the simulation of the electrical circuit of the wiper system.

NO	TOOL NAME	INSPECTION RESULTS	ACTION
1	Klem accu	None	Buy new
2	Box fuse	None	Must buy
3	Fuse	None	Buy new
4	Ignition	None	Buy new
5	Conecctor	There are still but there are already rusty ones	Replaced by using a banana jack
6	Cable	Something has been lost and damaged	Replaced with a new one
7	Sacs wiper	Doesn't work on high speed cables	Replaced
8	Motor wiper	Cannot function	Repaired and cleaned the armature
9	Motor washer	Still working fine	
10	Wiper arm	Dislodging at the connecting part with wipers	Buy new
11	Wiper blade	Still sweeping the liquid well	
12	Washer tank	Still working fine	Cleaned so that no dirt clogs the washer hose .
13	Wiper link	Still working fine	Cleaned, to work better
14	Nozzle	Works well	
15	Board in boardstand	There is already a broken part	Replaced because The conector will be replaced using the Banana Jack

Analyze the improvement process

In the repair of the simulation of the electrical circuit of the wiper system, there are several processes that must be carried out so that the damage to the existing wiper system does not get worse. The following is an analysis of the improvement process in the simulation of the electrical circuit of the wiper system.

1. components of the wiper system that no longer exist and install them.
2. Checking the entire cable using a test lamp to know the condition of the existing cable
3. After all the wires were checked, the author focused on checking the components of the wiper system, it was found that there were some wiper systems that could not work properly, then the author repaired them.
4. After the check was completed, it was found that there were several wiper systems that could not work properly
5. After the wiper system components are working properly again, the author again bags each cable with a test lamp to find out if the current is properly connected.
6. Then the author replaced the connector between the cables using a banana jack.
7. After all connectors are replaced with good ones, the author checks all fuses and cables related to the system.

8. After the re-check was completed, the author conducted a test on the simulation of the electrical circuit of the wiper system, when everything has been repaired and replaced, it was found that the entire wiper system can function again.

In the repair of the electrical circuit simulation, this wiper system has a maintenance procedure where the purpose of the maintenance procedure is to maintain the wiper system so that it is always in good condition.

In the simulation maintenance of the electrical circuit of the wiper system, there are several procedures that must be carried out so that the wiper system can work properly. The following is a simulated maintenance procedure for the electrical circuit of the wiper system.

- Make sure that the condition of the Accu is always in good condition so that the electrical circuit of the wiper system always receives good current and electrical voltage.
- Always make sure that the charging condition does not occur over charge so that the electricity in the wiper system does not receive current and voltage spikes that cause shorts.
- Make sure that the fuse is always in good condition. Make sure the switch is not exposed to any liquid. Make sure the wiper motor, wiper blaFrom the wiper switch, the current will flow to the cam switch point B where the cam switch point is the circuit breaker cam to the S+ terminal. When the wiper reaches the stop position, the cam switch point switches from side B to side A and the motor stops. Since there is no current flowing to the wiper motor then the current will stop at the wiper motor terminals.

Testing

Here are the results from the final testing of the system components Wipers converted in table form:

Table 4.2 Testing of wiper and washer system components

No	Component	Specifications	Result Examination	Conclusion	
1.	<i>Combination Switch</i>	Saklar Wiper KK position Front stores <i>Low On</i>	Wiper work With Low speed	Wiper Spinning with Low speed	Good
		Hides Wiper KK position Front stores <i>High On</i>	Wiper work with speed tall	Wiper Spinning fast	Good
		Switch <i>Washer</i> KK position on Switch <i>washer On</i>	Live	<i>Washer</i> work	Good
		Hides Pouch KK On Stores Off	Die	<i>Washer/wiper</i> not working	Good
2.	Contact Now	When key Contact <i>OFF</i> not exist connection between other terminals and when the ignition is ON terminals B, IG, and ACC Connected	None relationship on the other terminal in the ignition	Good	
3.	Cable	Not cracked or Porous	Flowing current with good	Good	
4.	Connector	Not there is rust	Still new	Good	
5.	<i>Fuse</i>	Fuse is not present who broke up	Still new	Good	
6.	<i>Wiper link</i>	Passing the power of the <i>wiper motor</i> into the power of the wiper return	Pass the power from the wiper motor well	Good	

Table 4.4 Wiper and washer system testing

No	System name	Test Position	Specifications	Test Results	Conclusion
1	System <i>Wiper</i>	Stores OFF, KK OFF	OFF	OFF	GOOD
		KK ON, Stores LOW position	ON	ON	GOOD
		MONTHS ON,Stores HIGH position	ON	ON	GOOD
2	Sistem <i>washer</i>	Stores OFF, KK OFF	OFF	ON	GOOD
		Stores ON	ON	ON	GOOD

Table 4.5 Wiper movement test per minute

No	Wiper Working Steps	Number of Movements Per Minute
1	Low Speed	35 Moves
2	High Speed	58 Moves

Table 4.6 RPM test of wiper motor rotation

It	Wiper Working Steps	RPM Speed Motor Wiper
1	Low Speed	38.5 RPM
2	High Speed	66.5 RPM

CONCLUSION

In the description of writing the Final Project report above, the following conclusions can be drawn:

1. Many wiring components of the wiper system are damaged and missing components.
2. Lack of maintenance on the simulation of the electrical circuit of the wiper system where this system cannot function.
3. The condition of the object being studied has stopped for a long time, making many components dusty so that the electric current is not maximized.
4. When the condition of the wiper system is replaced and repaired, this wiper system is still working very well.
5. In the simulation of the wiper system loss series, it is very useful for practice because it is easier to understand than learning directly on the vehicle.
6. Students can use a simulation of the electrical circuit of the wiper system for practice.
7. Maintenance of objects is important to avoid damage.

Suggestion

Here are suggestions regarding the simulation of the wiper system electrical circuit:

1. When you want to make repairs to the wiper system wiring, you must follow the repair procedure to minimize the level of damage.
2. Always use a taslamp for practice as it will be very helpful.
3. Do not install the wiper system carelessly, because it will be dangerous because there will be a short.
4. Always use the appropriate fuse to minimize the risk of damage to the system.
5. Always carry out maintenance procedures well.

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