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Engine Electrical System (Case Study on Mazda R2 Car in 1992)

Kasum [1*], Albert Kasman [2], Muhamad Kabul Habibi [3]
Mechanical Engineering Study Program, Akademi Teknologi Bogor
Jl. Bina Marga No.17, RT.05/RW.08, Baranangsiang, Kec. Bogor Tim., Kota Bogor, Jawa Barat 16143, Indonesia

ABSTRACT

Most electrical components, meaning that these components work because of the flow of electricity. Because the flow of electricity is invisible to the eye, repairing these electrical components is quite difficult. However, the flow of electricity can be measured and can be known after electricity is used, the literature method or literature review, is carried out by looking for reference books that can support the construction of the electricity system both through books and the internet and kn, owing the components and in order to know the damage that often occurs and how to overcome it. Knowing the components contained in the engine electrical system on the Mazda R2 car, knowing how the engine electrical system works on the Mazda R2 car, checking the engine electrical system on the Mazda R2 car. The process of implementing reconditioning is identifying, dismantling, checking physical conditions, cleaning, measuring, replacing incomplete components, tuning and testing electrical system and engine components. The components of the engine electrical system consist of, ignition keys, coils, platinum, distributors, spark plug cables, spark plugs, batteries (batteries). The mess that occurs is usually caused by a lack of maintenance and repair so that there is damage to these components.
***Keywords**: Electricity, Engine Electrical, Mazda R2.*

Corresponding author: kasum.wira@gmail.com
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Introduction

Most electrical components, meaning that these components work because of the flow of electricity. Because the flow of electricity is invisible to the eye, repairing these electrical components is quite difficult. However, the flow of electricity can be measured and can be known after electricity is used. The components included in the engine electrical system are the battery (battery), coil, distributor, platinum or CDI (Capacitor Discharge Ignition), carburetor, spark plug, and spark plug cable.

Main Problem

The main problems are as follows:

1. Component measurements and adjustments if not done properly can cause the engine electricity to not be achieved.
2. If the electrical system of the engine does not meet the requirements of the procedure, it will cause the engine to not start or there is no spark in the spark plug.
3. If the electrical system of the engine is not maintained regularly, it will occur

Theoretical Foundations

A car's electrical system is a series of electrical energy that is arranged to carry out a certain function on a car. This system is divided into several types, including ignition system, starter system, filling system. In general, engine electrical systems are grouped into two types, namely, conventional electrical systems consisting of, ignition systems, starter systems, and charging systems. Modern electrical systems such as EFI (Electronic Fuel Injection) system and comonrail system, ignition system aim to produce high-voltage electric current for the needs of combustion of fuel mixture in the combustion chamber of the combustion circuit in the ignition system there are two, namely primary ignition and secondary ignition, the ignition of the primary coil in the ignition coil connects between the positive terminal of the coil and the negative terminal of the coil. The secondary coil inside the ignition coil will connect between the positive terminal and the high voltage terminal of the coil.

The following is a form of conventional ignition system that is still often used today in vehicles that have a rhythm / rhythm controlled by mechanical breaker contacts. Such a process requires a fairly high level of wife power and mechanical equipment made from its disconnect contacts. The current from the contact switch connects several amperes up to 18,000 times per minute. The energy source of the induction ignition system is the ignition of the coil, the coil stores energy in its magnetic field and flows it to its fusing rapidly.

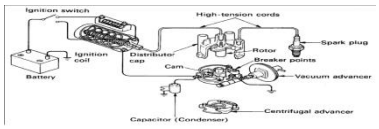


Figure 2.2. Conventional ignition system

Some of the disadvantages of the breaker contact system are that the breaker contact points will be easily oxidized due to water or dirt. In addition, in the breaker contacts, there is a change in the gap due to age, burning, or due to oxidation. As a result, the engine is difficult to start (start) considering the weakness of the breaker contact as described above, so experts developed the CDI system. The CDI system is superior to the breaker contact ignition system, especially in terms of the high voltage stability generated at each turn.

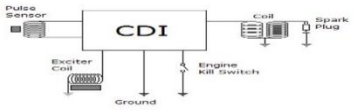


Figure 2.3. CDI ignition system

Circumstances	Possible Causes	Inspection/Repair

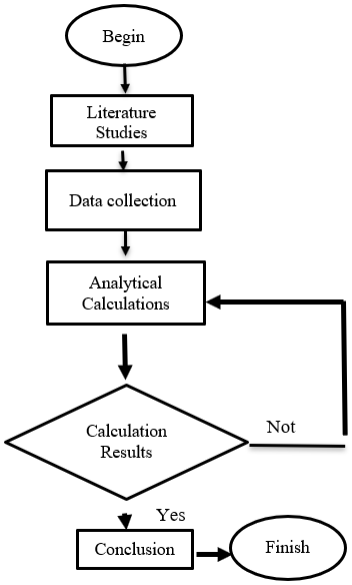
The electric current is not smooth, at the terminal poles there is white oxidation.	There are problems with the charging system, *overcharging*, undermaintenance.	Check and repair the charging system, clean the battery terminal poles by pouring hot water on both terminal poles until the oxidation disappears
The coil suddenly has no current.	Hot or weak coils.	Replace the coil in case of emergency.
Platinum, the engine suddenly shuts down and cannot be started.	The platinum spring is broken because it has been used for too long.	Replace the server.
The spark plug cable is limp and unpowered.	Spark plug cable disconnected, Broken spark plug wires, Insulation of spark plug wires is torn or damaged.	Reinstall the spark plug, Replace spark plug wires, In case of emergency, use electrical insulation and windings on leaking spark plug wires.
Wet spark plugs.	The spark plug is dead so that there is no spark jumping.	Check the spark plug with *a vealer gauge measurement.* Seal the spark plug gap with spark plug electrodes with a size of 0.80 - 0.90. Replace spark plugs.
The spark plug is stalled.	The spark plug is dirty, it has been used for a long time.	Replace spark plugs.

Symptoms of No Ignition

Research Methodology

The vehicle that will be maintained is a four-wheeled vehicle with a Mazda R2 engine in 1982. In this study, maintenance of the ignition system, electrical system and charging system on the Mazda R2 car was carried out at the Automotive Lab of the Bogor Academy of Technology on August 15 – September 1, 2021

Technology architecture flow chart



Mazda R2 car vehicle, but because of the many components and systems in this car, there are limitations to the objects that are studied in the Mazda R2 car vehicle, namely the electrical system, and ignition system. The limitation taken is the electrical system on the 1982 Mazda R2 car, the electrical system studied includes repairing the damaged electrical system, fuel lines starting from the fuel tank to the injectors, the ignition system starting from the power source from the battery to the spark plugs and detecting signs of damage to the electrical system.

The object of the electrical system research case study on the Mazda R2 car suffered damage where the existing engine electrical system did not function, therefore a thorough repair must be made to the engine electrical system so that it can function normally again, therefore there are the tools needed and the materials needed to repair the engine electrical system. The following tools needed to repair the engine electrical system are as follows:

Tool

A tool is an object used to make something.

No	Tool	Picture
1.	Spark Plug Lock	 Figure 3.2. Spark plug lock
2.	Lock 12 mm, 19 mm	 Figure 3.3. Lock 12 mm, 19 mm
3.	Screwdriver (+) and (-)	 Figure 3.4. Screwdriver (+) and (-)
4.	*Dwell Tester*	 Figure 3.5. *Dwell tester*
5.	Avo Meter	 Figure 3.6. AVO Meter
6.	*Timing Light*	 Figure 3.7. *Timing light*
7.	*Feller Gauge*	 Figure 3.8. *Feller gauge*
8.	Petrol	 Figure 3.9. Petrol

9.	Sandpaper	 Figure 3.10. Sandpaper

Material.

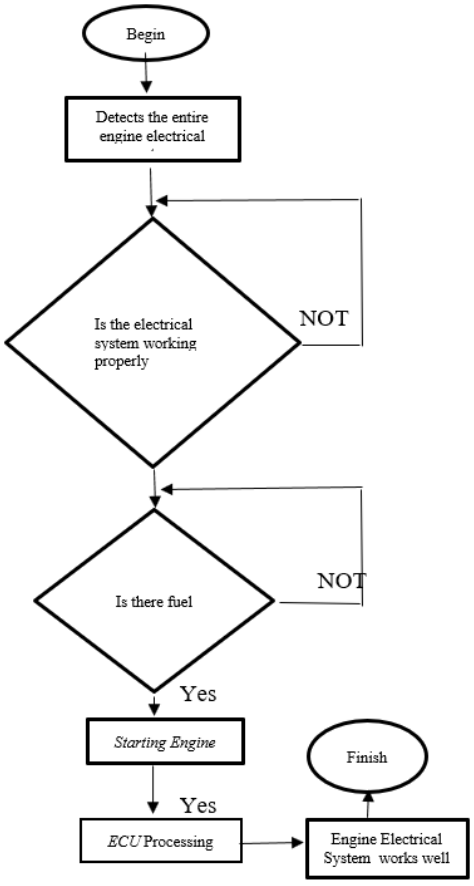
Materials are things that will be used to work on a project.

Mazda R2 Car Engine Year 1992

Input Analysis

Input analysis is the input from the engine electrical system that will be processed by the ECU to get the output, the following is a flow chart of the engine electrical system input analysis.

Figure 3.12. Input Analysis



Output Analysis

Output analysis is the result of energy that is managed from the existing input to the useful and the rest of the combustion result. The following is a flow chart of output analysis.

How the Ignition System Works on the Mazda R2 Car

Open the vacuum rubber duct leading to the advance vacuum mechanism if the distributor is installed with a stroboscopic timming light . If the distributor has a double diagram, the vacuum mechanism advances for rising and slowing down then disconnect the two rubber pipes connecting the stroboscopic to the number one spark plug cylinder. Run the machine at engine speed.

When Contact Breaker (breaker point) Shut

The current from the battery through the ignition key flows to the B terminal of the ignition coil, further to the primary coil, and gets the mass from the breaker contact circuit, i.e. from the negative terminal of the ignition coil to the platinum and gains the mass. As a result, magnetism occurs in the iron core of the ignition coil. The magnitude of magnetism depends on the amount of current flowing and the number of windings and the length of the closing breaker contact (dwell angle)

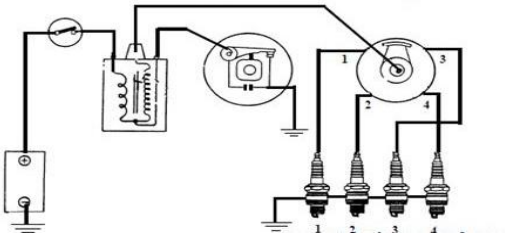


Figure 4.2. When the Breaker Point Contact Closes

When the breaker point contact opens

When the breaker contact opens, the current in the primary coil will be cut off so that the magnetism in the iron core disappears. The loss of magnetism results in a change in the magnetic force line around the iron core. The impact caused by this event is that there will be an induction of 300 V to 400 V. At the same time the secondary coil also produces a self-induction voltage. The induced voltage generated in the secondary coil is 10,000 V to 30,000 V. This high voltage is then flowed to the distributor to be distributed to the spark plugs of each cylinder according to the ignition sequence (FO).

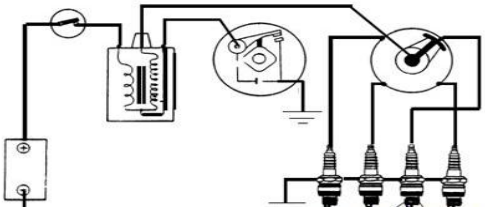


Figure 4.3. At the time of the breaker contact (breaker point opens)

Capacitor

The capacitor functions to absorb or prevent spark jumps that occur in the breaker contact when opening. The breaker contacts often burn out as a result of the use of capacitors that are not in accordance with their capacity or their capacity is abnormal. The capacity of the capacitor is measured in microfarad units. There are three types of capacitors used in motor vehicles, namely green wire capacitors, yellow wire capacitors, and blue wire capacitors.

Result and Discussion

Measurement Results

1. Check the resistance of spark plug wires

Component Name	Measurement Results
Voltage cable no 1	22 kW
Voltage cable 2	23 kW
Voltage cable 3	23 kW
Voltage cable 4	24 kW

K In conclusion : The spark plug cable is still good.

2. Electrode gap inspection of spark plugs with feeler gauge.

Spark plug electrode	Examination results
NGK	0.30 – 0.40 mm

Conclusion : The spark plug wheel exhaust gap is damaged.

3. Spark plug gap measurement results

spark plug gap	Measurement results
Spark plug 1	0.39 mm
Spark plug 2	0.39 mm
Spark plug 3	0.35 mm
Spark plug 4	0.35 mm

Conclusion : The condition of the spark plug gap is damaged.

Conclusion

Based on the description above, it can be concluded as follows:

1. The components of the engine electrical system consist of. from, ignition keys, coils, platinum, distributors, spark plug cables, spark plugs, batteries (batteries). The mess that occurs is usually caused by a lack of maintenance and repair so that there is damage to these components.
2. How to carry out maintenance and overcome disturbances that occur in the engine electrical system on the Mazda R2 Car is by performing periodic maintenance and inspections so that there is no damage to the engine components

Suggestion

The writing suggestions that I want to convey include:

1. Check the engine's electrical system, to find out if the engine is damaged or not
2. Replace components in the engine's electrical system, such as spark plugs. It should be replaced when the time limit for use has expired (20,000 km), because it can no longer carry out its function to spark fireworks.

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