

TROUBLESHOOTING TEMPERATURE GAUGE ON CONTROL PANEL OF ENGINE 3066 AT ALAT BERAT WORKSHOP OF POLITEKNIK NEGERI JAKARTA

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Abstract

Troubleshooting on the temperature gauge on the engine control panel 3066 with the serial number is 7JK a method used to find the cause of the problem with the temperature gauge. The temperature gauge contained in the 3066 control panel engine does not work while running. Therefore, this research aims to determine the cause of the temperature gauge on the 3066 control panel engine not functioning. The form of this research is to take data on the method of problem solving and repair of temperature gauges that are experiencing problems by buying new components that do not use transformer step-ups. Instrumentation data in literature research, data, visual inspection and making changes to temperature gauges. The results of conducting literature studies, studying data, visual inspection, and replacing the temperature gauge with a new one on the 3066 control panel engine, get the root of the problem of damage to the coil of the step up transformer because the input voltage is too large.

Keywords : Troubleshooting, Control Panel, Heavy Equipment, Temperature Gauge.

Abstrak

Troubleshooting yang dilakukan pada temperature gauge pada control panel engine 3066 dengan serial number 7JK adalah sebuah metode yang dilakukan untuk mencari sebuah penyebab terjadinya masalah pada temperature gauge tersebut. Temperature gauge yang terdapat pada control panel engine 3066 tersebut tidak berfungsi pada saat running. Oleh karena itu penelitian ini bertujuan untuk mengetahui penyebab temperature gauge pada control panel engine 3066 tidak berfungsi. Bentuk penelitian ini adalah dengan pengambilan data pada saat dilakukannya metode troubleshooting dan dilakukannya perbaikan pada temperature gauge yang mengalami problem dengan cara membeli komponen baru yang tidak memakai trafo step up. Instrument pengumpulan data dalam penelitian ini secara studi literature, pengumpulan data, visual inspection dan melakukan penggantian pada temperature gauge, Akar masalah terjadinya kerusakan pada kumparan dari trafo step up karena arus masuk terlalu besar .

Kata kunci : Troubleshooting, Control Panel, Alat Berat, Temperature Gauge.

Introduction

The engine control panel plays an important role in monitoring various information contained in the machine, especially on the Caterpillar 3066 engine. This aims to reduce repair costs fairly, so that the engine is always in normal condition or ready to use. Another disadvantage caused by the malfunction of the engine control panel is that we will not be able to monitor the engine and it is likely that it will cause quite severe damage, which has an impact on losses for the Jakarta State Polytechnic and

Heavy Equipment Engineering students. [1].

The temperature gauge functions to make it easier to monitor the temperature of the coolant on the 3066 engine. Based on data from the initial test results in heavy equipment workshops [2], [3], the condition of the engine control panel 3066 (figure 1) belonging to the Jakarta State Polytechnic is currently not optimal, where there are still gauges and indicators that are not working optimally and are damaged. One of them is because the temperature gauge on the control panel

does not work when running the 3066 engine. The temperature gauge emits smoke during the initial test, which causes the temperature gauge to not function at all. Before repairing the temperature gauge on the engine control panel 3066, troubleshooting steps are needed [4]–[8] to determine the cause of the damage. Therefore, the author raises the research topic "Troubleshooting Temperature Gauge on Control Panel Engine 3066".

The purpose of this research is to explain the steps in troubleshooting temperature gauge on the 3066 engine control panel. In addition, this study will discuss the causes of temperature gauge damage to the 3066 engine control panel.

Research Methods

The writing method used in this research is Troubleshooting. Troubleshooting [4]–[8] (Overcoming disorders) means collecting various possible causes of the disorder, as well as making improvements to the disorders and preventing the occurrence of the same disorders as before [4], [8]. Overcoming Distraction is a way of tracing problems that occur by gathering information both verbally, facts and data so that they can provide an overview of the problems that occur in order to be able to make conclusions on existing disturbances and be able to solve them immediately.

The engine that will be used as research material for the troubleshoot is Engine 3066 [9] which is owned by the Heavy Equipment Study Program, Jakarta State Polytechnic. The Caterpillar 3066 [9] engine is a diesel engine with a fuel injection pump that is mechanically driven. This type of engine is in-line and has six cylinders. Each cylinder liner has one inlet valve and one exhaust valve. Each valve has one valve spring. Each cylinder has one piston cooling jet attached to the cylinder block. The

cooling jet piston sprays lubricating oil to the inner surface of the piston to cool the piston. The piston has two compression rings and an oil control ring. It is important to ensure the correct cylinder liner height so that the piston does not touch the cylinder head. The correct cylinder liner height also ensures the efficient fuel combustion needed to meet emission requirements. 3066 engine specifications [9] are shown in table 1.

Results and Discussion

In this discussion, the 8-step Troubleshooting Method will be carried out to find the cause of the temperature gauge problem on the 3066 engine.

1. Make sure the problem really occurs. At this stage the writer collects information related to the control panel to be worked on. Some of them are the control panel used (Figure 2), username / engine mechanic: Mr. Khaidir Juna, Prefix Engine: 7JK (Figure 3) and the problem that occurs is that the temperature gauge is not functioning (Figure 4). Where the temperature gauge has an AC220 V.

In addition, at this stage the author asks several questions and listens to complaints from users. The information obtained, among others, is that the temperature gauge turns off suddenly while running and when that happens the user immediately turns off the running process.

2. Determine the problem by taking notes

The Engine 3066 control panel for some time was still working properly and the temperature gauge was still on. However, during the last running on February 28,

2020, the temperature gauge turned off and emitted smoke in the gauge section.

Control panel engine 3066 running in the machine workshop area so that geographical conditions are eliminated. When running the engine, the 3066 is in a sunny and not hot condition, making it safe. This condition is called safe because the sun's heat cannot damage the temperature gauge because the temperature is 27°C. When a problem occurs, we are accompanied by an experienced technician.

There is no preventive maintenance done because the 3066 engine is not used or running every day. So it's hard to find PM. At that time, the engine hours meter after installing the control panel was optimized for 3.8 hours. No improvements have been made after several months of optimizing the previous control panel. SIS (Service Information System) has not found anything related to the related problem. In SIS, there is no troubleshooting method for temperature gauge.

3. Check visually

The Visual Temperature Gauge condition can be seen in table 2. Visually the 3066 engine is still good and safe for running or for practicing in heavy equipment workshops. Visually looking at the shape of each gauge and indicator on the panel, there are no significant problems found. The cables (figure 5) on the panel were not damaged, such as burns.

4. List all possible causes

Several possible causes include

- a. The cable has a short circuit,
- b. Step up is damaged
- c. Step down is damaged,
- d. Loose cable connection,
- e. The temperature gauge is not working,
- f. Temperature sender not working.

5. Perform the test and record the results
At this stage, a possible damage analysis is carried out:

- a. The cable has a short circuit
- b. Step up transformer is damaged (picture 6)
- c. Step down is damaged where the cable connection is loose (Figure 7)
- d. The temperature gauge is not working
- e. Temperature sender not working

After testing, information was obtained that the damage was in the step up and step down transformers. So that a new temperature gauge was purchased with a power input of 12 VDC so as not to use a step-up transformer anymore. For step down, a new purchase is made so that it can be used to reduce the voltage to be sent to the temperature gauge.

6. Find the root of the problem

Based on the results of the tests that have been carried out, the results obtained are that there is no output on the step-up transformer due to the breakdown of the coil in the step up transformer, so the temperature gauge cannot function properly. The cause of the problem that occurs in the step up transformer is human error due to incorrect use of the battery while running which causes a very large incoming current and damages the coil. The voltage that goes to the step up and step down transformers is in the form of AC voltage coming from the alternator. And the cause of the problem in the step down is because the age of the step down is very long and is used continuously. In addition, it was also found negligence in connecting the cable using a solder so that the variable resistor was leaking which resulted in a short step down.

7. Repair Damage

The followings are the replacement procedure:

- a. The ignition is off,
- b. Loosen the min bolt using a small screwdriver (Screw Driver),
- c. Remove 2 power input cables and 2 temperature sender cables from the temperature gauge, (Figure 8)
- d. Remove the temperature gauge from the control panel,
- e. Then replace the temperature gauge with a new one with a 12VDC power input. (Figure 9)

8. Analyze why the problem occurs

The following is an analysis of the problems that have occurred.

- a. Damage to the step up transformer is caused by the use of a battery with a CCA (Cold Cranking Ampere) capacity of 1000. At step up the amount of current needed is 4 A, if the incoming current is excessive, the coil will break because it cannot flow more than the required capacity. Meanwhile, the step down is damaged due to errors in Man or human error. At the time of wiring the output, solder on the variable resistor part made of plastic. The variable resistor functions to regulate how many limits the voltage drop in step down. Inside the variable resistor there is a liquid which when it leaks and other components are exposed to the liquid when the voltage is applied, the component will short and be damaged.
- b. If the error occurs after testing or a new problem appears, perform the troubleshooting steps again.

Conclusion

In this study, based on the results of the troubleshooting that has been carried out, it can be concluded that the root of the problem. at the temperature gauge engine 3066, there is damage to the step up transformer due to the absence of output due to a break in the coil, if the coil

breaks, the step up transformer does not produce a voltage of 220 VAC.

The cause of the step up transformer to break is because the incoming current is greater. So that to make the temperature gauge function again, a replacement is made to the temperature gauge itself. As for the damage to the step down is caused due to an error when connecting the cable in the step down, where the solder used to connect the cable is about the variable resistor so that the variable resistor leaks and eventually a short occurs during testing. For repairs, a new step down was replaced.

Meanwhile, to avoid similar problems, the user must follow the installation and use procedures according to the manual book. In addition, mechanics are required to use spare parts according to the specifications in the manual book.

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Table 1. Specifications of Engine 3066

| | |
|-------------------------------------|--------------------------------|
| <i>Cylinders and Stroke</i> | 6 Cylinder and 4 stroke |
| <i>Combustion system</i> | Direct injection |
| <i>Bore</i> | 102 mm (4.02 inch) |
| <i>Stroke</i> | 130 mm (5.12 inch) |
| <i>Displacement</i> | 6.4 L |
| <i>Cylinder arrangement</i> | <i>In-line</i> |
| <i>Valve setiap cylinder</i> | 2 |
| <i>Firing order</i> | 1-5-3-6-2-4 |
| <i>Compression ratio</i> | 17 : 1 |



Figure 1. Current Condition of Engine 3066



Figure 2. Control Panel of Engine 3066

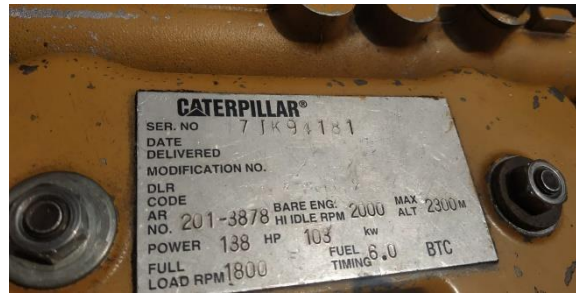


Figure 3. Identity of Engine 3066



Figure 4. Temperature gauge 220ACV model on engine 3066

Table 2. Visual Condition of Temperature Gauge

| No. | Checklist | Result | | Notes |
|-----|-------------------|--------|----------|-----------------|
| | | Good | Not Good | |
| 1. | Visual Inspection | V | | Good component |
| 2. | Cable Arrangement | V | | Cable connected |
| 3. | Function | | V | Does not work |



Figure 5. Visual state of the cables on the control panel



Figure 6. Condition of Step Up Transformer

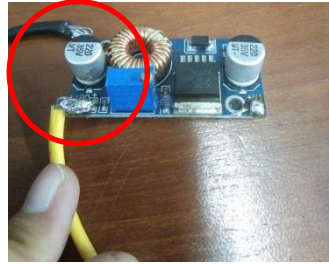


Figure 7. Condition of Step Down Transformer

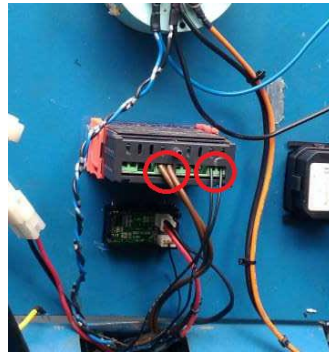


Figure 8. Position of Cables on the Temperature Gauge



Figure 9. Temperature gauge 12DCV model on engine 3066