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STUDY ON THE AFTERMARKET PRODUCTS OF IGNITION SYSTEM IN
RELATION OF ENGINE PERFORMANCE

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“I admit that this report is all written by me except for the summary and the article which I have stated the source for each of them.”

Signature :

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Especially for beloved mom and family

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Hope this report will become the guideline and reference for the other students in the future.

ABSTRACT

The ignition system is of one important system in the operating the vehicles of internal combustion engine. The purpose of ignition system is to create spark which is will ignite with the air-fuel mixture in the cylinder of an engine. The ignition spark must occur at the right timing to avoid the operation of engine become inefficiently. So, the aftermarket products of ignition system will be compared with the original ignition system that installed in the vehicle in determining the performance of the engine. The aftermarket ignition systems have been advertised that they have more horsepower from complete combustion which is meant having better performance. The ignition system that been study in this case are the spark plug and the ignition cable wire.

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CHAPTER 1

INTRODUCTION

1.1 PROJECT BACKGROUND

Ignition system is one of important system for the vehicle. There are many ignition systems sales in the market nowadays. Some of them are being promoted that with standard engine performance can be improved. So, this project is concern on the ignition system that being on sales and some of experiments need to be made to be acquainted with the effects of the aftermarket ignition system in relation with engine performance.

Before doing this project, the principle and theory of the systems need to be understood and know. Basically, the some of important parts in ignition system are spark plug, ignition wires, distributor and ignition coil.

1.1.1 IGNITION SYSTEMS

Ignition system is very important in internal combustion engine because the purpose of this system is to create spark which is will ignite the air-fuel mixture in the cylinder of an engine. The ignition spark must occur at the right timing to avoid the operation of engine become inadequately. So, the ignition system conveys particularly a high voltage to the spark plug in each cylinder as soon as the piston at the top which at the compression stroke. Therefore, ignition system needs to create a high voltage to sweep across the gap of a spark plug and create a strong spark which

used to ignite the air-fuel mixture for combustion process occurs. However, this system needs to control the spark timing with the intention that the spark takes place at the exact time and at the right cylinder.

1.1.1.1 IGNITION COIL

The coil is a simple device which is basically a high-voltage transformer constructed by two coils of wire. For the design of ignition coil, one coil of wire is known the primary coil that enfold around the secondary coil.

The ignition coils is the component responsible for adapting the low battery voltage into high voltage that essential in generate flashover at the spark plug. The operation of ignition coils is using the principle of the electromagnetic induction. The energy stored in the magnetic field of the primary winding is then conveyed by the magnetic induction to the secondary side of the coil. Therefore, the general function of the coils are to stored the magnetic energy that developed in magnetic field which generated by primary current and discharge the energy when the primary current is deactivated at the moment of ignition.

1.1.1.2 SPARK PLUG

The theory that used in spark plug is it powered electricity to arc across a gap and the electricity required to be at a very high voltage in order to cross the gap and creates a good spark. Therefore, the function of the spark plug is to establish the ignition energy into the combustion chamber and creates a spark between the electrodes to set off the combustion of the air-fuel mixture.

The spark plug plays a vital role influential the operation of the engine and one of it role is it necessitate to ease reliable at the cold starts. Besides, it must make certain that the operation is consistent such as none of ignition neglected during its

service life. Spark plug also should not overheat under the comprehensive operation especially when the engine at the maximum speed.

1.1.1.3 IGNITION WIRES

The ignition wires need to be thick enough because they need to deliver a very high voltage current. They are necessary to get the massive power to the spark plug with no seep out. Besides, they need to bear the heat from the engine and the tremendous change in environment temperature. Because of this, the wires is essentially thick and if the wires starts to harden, crack or dry out, they need to be change because they not able to distribute the required voltage and misfire will transpire. So, the engine will run poorly.

1.1.1.4 DISTRIBUTOR

The distributor function is to distribute the high voltage from the coil to the right cylinder and this role is performed by the cap and rotor. The coil is attached to the rotor and turning inside the cap. A high voltage pulse will come from the coil when the tip of the rotor elapse each contact at the each cylinder. The engine can have a problem when some of the components exhaust, therefore the cap and rotor need to be substitute when tuning up the engine because these components easy to wear out due to the arching.

1.1.2 TIMING

The ignition system has to work in the ideal performance together with the rest engine systems. Therefore, the fuel needs to ignite at the right time so that mounting gases can do the greatest amount of work and if it fires at the incorrect

time, power will decrease while the gas consumption and emissions will increase. So, to preminent use of the fuel, the spark must occur before the piston arrives at the top of cylinder during compression stroke. Therefore, as the time of piston starts coming down during power stroke, the pressures are enormous enough to produce the valuable work.

The timing can be set by slacken off a hold-down screw and turning the body of the distributor. The engine can run properly by setting the primary or base timing because the timing requires changing depends on the speed of the engine and the load that it have.

1.2 PROBLEM STATEMENT

There are a number of ignition systems on the market and some of them are advertised can improved standard engine performance. We need some experiments to know the effects of aftermarket ignition system in relation with engine performance.

1.3 OBJECTIVE

The objective of this project is to study the effects of aftermarket products of the ignition system in relation with engine performance. Besides, the other objective is to determine the combination of ignition system components that can give optimum engine performance. Emissions that been produced by the vehicle when using different type of ignition components also will be determined in this study.

1.4 SCOPE

The scope of this project is conducting experiments to test same aftermarket products of ignition system components (spark plug and cable wire). From here, the aftermarket products and the original product will be comparing based on each performance. Besides, the experiment to mix the combination of ignition system components will be conduct in order that to achieved the optimum engine performance.

1.5 SUMMARY

So, this report for the PSM 1 will include the literature review about the projects and the methodology used in achieving the objective of projects. For PSM 2 report, the results of the experiment will be include and discussion about the project. Besides, the suggestion and conclusion of the projects will be included in PSM 2 report.

CHAPTER 2

LITERATURE REVIEW

2.1 INTRODUCTION

Literature review is the result of any research that have been made for the project that been conducted. For the aftermarket ignition system, I have found none about this research but I manage to find the article about the ignition system especially the research that been made by the automotive company in their research and development.

2.2 THE EFI/TCCS IGNITION SYSTEM

The ignition system that been install in the EFI/TCCS engine are currently not have a lot of different from the normal 4M-E EFI engine. The igniter controlled the primary circuit current flow that based on the signals which is generated by a magnetic pickup coil located in the distributor. The purpose of ignition system is to distribute the high voltage spark to the right cylinder and at the right time. The perfect timing of ignition will results in the maximum combustion pressure.

The most important difference between TCCS and normal EFI ignition system is the way spark angle is managed. The normal EFI ignition employ the mechanical advance weights and vacuum diaphragms in achieving the perfect timing while the TCCS ignition systems control the spark ignition timing electronically.