



**NATURAL GAS VEHICLE (NGV)**

**ROSLAN BIN SAID**

**(99083603)**

**MOHD ADAMI BIN MUDA**

**(99083276)**

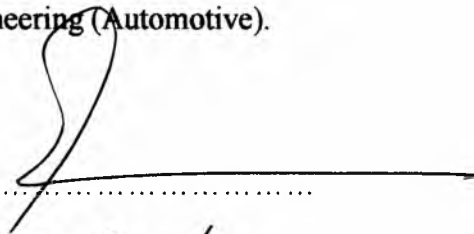
**DIPLOMA IN MECHANICAL ENGINEERING**

**(AUTOMOTIVE)**

**UNIVERSITI TEKNOLOGI MARA (UiTM)**

**APRIL 2002**

"I declare that I have read this thesis and in our point of view this thesis is qualified in term of scope and quality for the purpose of awarding the Diploma of Mechanical Engineering (Automotive).

Signed :  .....

Date : 13/04/2002 .....

Supervisor or Project Advisor

**En. Hamidun Md Isa**

Faculty of Mechanical Engineering  
Universiti Teknologi MARA (UiTM)  
40450 Shah Alam  
Selangor

## **ABSTRACT**

In Malaysia, Natural Gas Vehicle (NGV) is widely used in the commercial vehicles such as taxi. Normally, it can only be found in the urban cities in Malaysia because of inadequate facilities that can support the usage of this technology. This technology is also proven to be friendlier to the environment compared to the petrol engine. Due to that, an alternative fuel that can solve the ecological problems can be obtained from it. However, the knowledge of our people regarding on this system can be considered lagged the other developing countries. Furthermore, it has also been proven that an engine, which is equipped with this system, is less powerful compared to an engine with conventional fuel system. These have encouraged us to choose NGV as the subject of our study in order to acquire in depth understanding of this system. We have already bought all components, which are required to build this system. From there, we started to assemble the whole components before installing the system to an engine. During the assembling and installations process, we had used many types of equipment, which can be found in the workshop. These equipments include the grinding machine, folding machine, drilling machine and welding machine. This project had also required us to build a frame that is used to support the entire system so that the engine can run smoothly. The frame was also built under some considerations in order to avoid any problems that may arise in the future. In our study, we found that the entire system needs a clean air filter to make the engine runs easily. Proper timing is also required to obtain the same result. Finally, the system also needs to be mounted by rubber mounting to reduce vibrations that can cause the components to be defective. Upon completion of the project, the engine is at proper running condition.

## **TABLE OF CONTENTS**

| <b>CONTENTS</b>                        | <b>PAGE</b> |
|--|-------------|
| TITLE                                  |             |
| ACKNOWLEDGEMENT                        | II          |
| ABSTRACT                               | III         |
| TABLE OF CONTENTS                      | IV-VIII     |
| LIST OF TABLES                         | IX          |
| LIST OF FIGURES                        | X           |
| FLOW CHART FOR PROJECT SHHEDULE        | XI          |
| <br>                                   |             |
| <b>CHAPTER 1</b>                       |             |
| <br>                                   |             |
| INTRODUCTION                           | 1-2         |
| <br>                                   |             |
| <b>CHAPTER 2</b>                       |             |
| <br>                                   |             |
| DRIVING WITH NATURAL GAS VEHICLE (NGV) |             |
| 2.0 Starting and running with NGV      | 3           |
| 2.1 Cold starting                      | 3           |
| 2.2 Warm starting                      | 4           |
| 2.3 Switching from NGV to petrol       | 4           |

|   |     |
|---|-----|
| 2.4 Switching from petrol to NGV                          | 4-5 |
| 2.5 Refueling   | 5   |
| 2.6 Converting gasoline vehicle to operate on natural gas | 5-6 |
| 2.7 Converting diesel vehicle to operate on natural gas   | 6   |
| 2.8 Characteristics comparison between gasoline and NGV   | 6-7 |
| 2.9 Composition of natural gas (by volume)                | 7   |

### **CHAPTER 3**

#### **SYSTEM, OPERATION, AND MAINTENANCE**

|   |       |
|---|-------|
| 3.0 The natural system and its operation      | 8     |
| 3.0.1 NGV components                          | 8-9   |
| 3.0.2 Description of componentry              | 9-17  |
| 3.0.3 Operation of NGV system                 | 17-18 |
| 3.0.4 Description of NGV regulator            | 18-19 |
| 3.0.5 System priming, idle circuit            | 19    |
| 3.0.6 Safety features                         | 19-20 |
| 3.1 Operation instructions                    | 20    |
| 3.1.1 Switching fuel (selector switch)        | 20-21 |
| 3.2 Maintenance of the NGV system             | 22    |
| 3.2.1 Routine maintenance                     | 22-23 |
| 3.2.2 Annual inspection                       | 23    |
| 3.2.3 Cylinder re-testing                     | 23    |
| 3.2.4 Regulator dismantling and re-assembling | 24    |