LEVEL F

Piston Engine Fundamentals TC010-05-01S

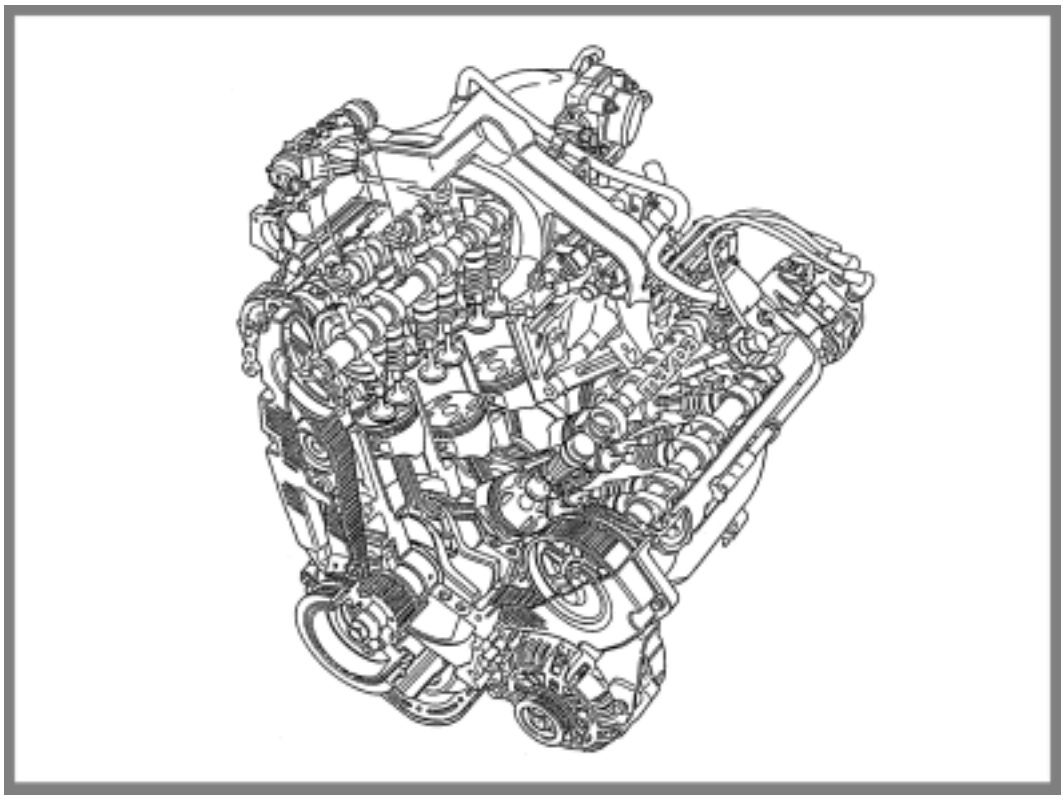
Mazda Motor Corporation
Technical Service Training

CONTENTS

CONTENTS

CONTENTS

1 – INTRODUCTION



COURSE OVERVIEW

Welcome to the Mazda self-study guide *Piston Engine Fundamentals.* Before you begin, please read the following information.

Audience and Purpose

This guide is designed for entry-level automotive technicians. It introduces the basic principles of engine operation, as well as descriptions of major engine components.

The guide assumes that you have little or no knowledge about engine operation. The information covered in this guide is required for Mazda's Engine Course.

1 – INTRODUCTION

Course Content and Objectives

In addition to this Introduction (Section 1), this guide includes five major sections and a glossary. The objectives for each section follow.

2 – Basic Engine Operation

- Describe how engines generate and control power.
- Describe the four-stroke cycle.
- Define engine design characteristics, such as bore, stroke, and displacement.

3 – Short Block

- Identify the major parts of the short block.

4 – Valve Train

- Identify the major parts of the valve train.

5 – Lubrication System

- Identify the major parts of the lubrication system and describe how they lubricate engine parts.

6 – Cooling System

- Identify the major parts of the cooling system and describe how they control engine temperature.

7 – Glossary

- Define terms used throughout this guide.

1 – INTRODUCTION

HOW TO USE THIS GUIDE

To get the most benefit from this guide, complete the sections in order, from 1 through 6. Allow enough time to complete each section, and don't try to complete the whole book in one sitting. **You will retain more of what you learn if you split up the reading and review exercises over several days.**

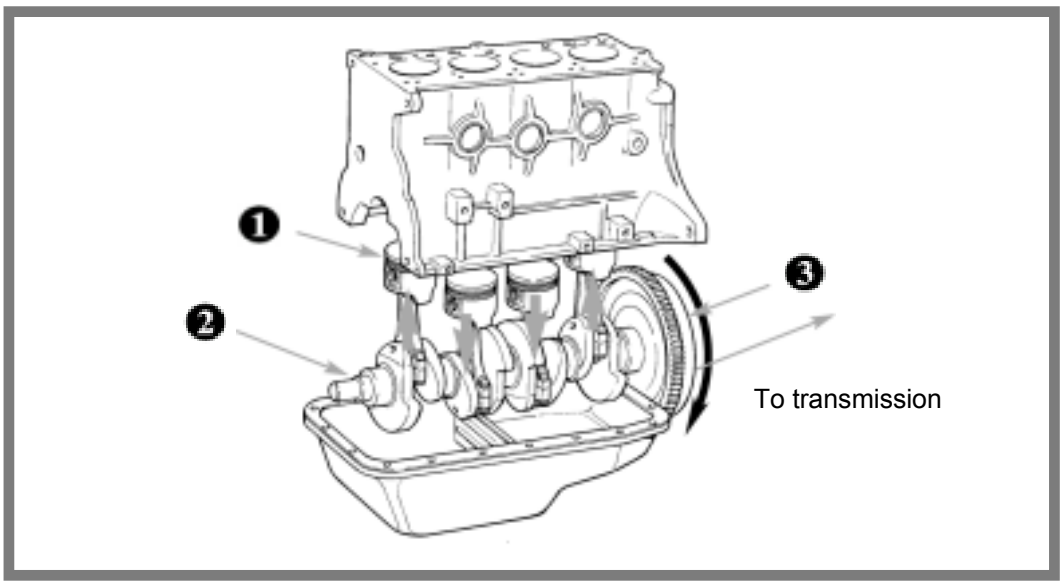
Section Objectives

Each section begins with a list of learning objectives. These objectives tell you exactly what you will learn in the section. Read these objectives before you begin a section. When you have completed the section, go back and review the objectives to make sure you have learned the material.

Text and Illustrations

Each section includes text and illustrations that explain important concepts and terms. Read the text carefully and study the illustrations. You may also want to take notes as you go along.

Each illustration includes numbered "callouts" that identify engine parts or processes described in the text. The numbered items beside the illustration identify the parts that are called out, as shown in the following example from Section 2.



1. **Piston**
2. **Crankshaft**
3. **Flywheel**

1 – INTRODUCTION

Review Exercises

This guide includes nine sets of Review Exercises, which appear at various points throughout the guide. These exercises are designed to check your understanding of the material. Make sure you answer the questions in each Review Exercise. Then check your answers with the answer key.

If you're not sure about one or more of your answers, go back and read the material again. Make sure you understand the previous material before you move on to new material.

2 – BASIC OPERATION

In a car or truck, the engine provides rotating power to drive the wheels. This power is transferred to the wheels through the transmission and driving axle. The source of this rotating power is the energy released when fuel burns in the engine's cylinders.

This section provides an overview of how the engine converts energy from burning fuel into power that drives the vehicle's wheels.

OBJECTIVES

After completing this section, you will be able to describe how:

- The cylinders and pistons convert energy from burning fuel into power.
- The crankshaft converts up-and-down motion into rotational (turning) motion.
- The flywheel stores energy for a smooth transfer of power.
- The four-stroke cycle operates.
- Valves control intake and exhaust in a cylinder.
- Engines are classified by their design characteristics, including:
  - Cylinder configuration
  - Valve train type
  - Bore, stroke, and displacement
  - Compression ratio