

## Introduction

The engine is the power plant of a vehicle. Automotive engines have gone through tremendous changes since the automobile was first introduced in the 1890s, but all combustion engines still have three requirements that must be met to do their job of providing power – air, fuel, and ignition. The mixture of air and fuel must be compressed inside the engine in order to make it highly combustible and get the most out of the energy contained in the fuel mixture. Since the mixture is ignited within the engine, automobile power plants are called **internal combustion engines**. Most can be further classified as **reciprocating piston engines**, since pistons move up and down within cylinders to provide power. This up-and-down motion is converted into turning motion by the crankshaft.

This course will provide an introduction to automotive engines and engine repair. Subjects covered will include:

- Major engine components
- Engine classifications
- The four stroke cycle and other engine design operations
- Engine construction
- General engine mechanical diagnosis
- Engine removal and installation
- Cylinder head and valve train diagnosis and repair
- Engine block assembly diagnosis and repair

## Unit 1 - Basic Engine Parts and Operation

### Unit Objective:

After completion of this unit, students should be able to identify internal combustion engine components and their modes of operation.

### Specific Objectives:

- Identify engine design associated terms and definitions
- Identify internal combustion engine components
- Understand and be able to explain basic internal combustion engine operation
- Identify common internal combustion engine design classifications

A small engine, such as one found in a lawn mower, usually contains only one cylinder and piston. Automotive engines use a number of cylinders to produce sufficient power to drive the wheels, but operate much like a small engine in many ways. Let's look at one cylinder of an engine to see how the main parts work together.

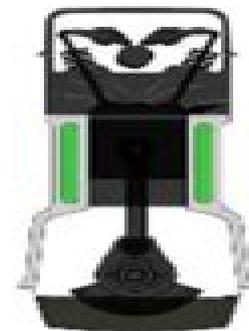
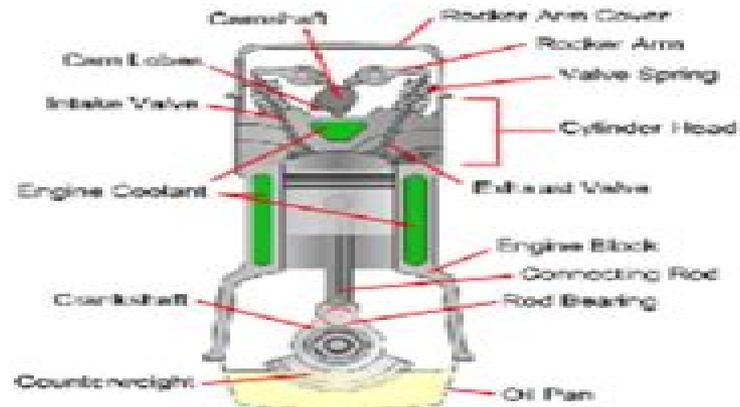
### Engine Block

The block, highlighted at right in grey, is a heavy metal casting, usually cast iron or aluminum, which holds the lower parts of the engine together and in place. The block assembly consists of the **block**, or **crankshaft**, **main bearings** and **caps**, **connecting rods**, **pistons**, and other components, and is referred to as the **bottom end**. The block may also house the **camshaft**, **oil pump**, and other parts. The block is machined with passages for oil circulation called **oil galleries** (not shown) and for coolant circulation called **water jackets**.

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Some of the main engine components



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**United States. Department of the  
Army**



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**Trade and Industrial Education; Instructional Materials** Ohio State University. Center for Vocational and Technical Education,1972     **USAFI Standard Nomenclature List** United States Armed Forces Institute,1953     **Trade and Industrial Education** ,1972     A1 Engine Repair Mat,2011-03-01     *Guide to the Automobile Certification Examination* James G. Hughes,1997 This book is a basic essential for anyone preparing to take the A S E exam It includes more than 2000 practice questions using the A S E style and format and is organized around the A S E subject areas KEY TOPICS Chapter topics cover engine repair automatic transmission transaxle manual drive train and axles suspension and steering brakes electrical electronic systems heating and air conditioning engine performance advanced engine performance specialist light vehicle compressed natural gas engine machinist and parts specialist For individuals preparing to take the A S E exam

**Engine Repair** Charles Ginther,Delmar Cengage Learning,Delmar Publishers,2014-05-14 The fifth edition of Delmar s Automotive Service Excellence ASE Test Preparation Manual for the A1 ENGINE REPAIR certification exam contains an abundance of content designed to help you successfully pass your ASE exam This manual will ensure that you not only understand the task list and therefore the content your actual certification exam will be based upon but also provides

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**Resources in Education**, 1984 Serves as an index to Eric reports microform

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**Automotive Service Excellence Certification Self-study Guide** National Institute for Automotive Service Excellence, Advanstar Communications, 2002

Small Engine Repair National Learning Corporation, 2020-03-15

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