

-28- This results in a high temperature exceeding the ignition point of the fuel.

(C) Combustion Stroke (See Figure 2-3) With the intake valve S and the exhaust valve E closed, the fuel, pressurized by the fuel injector, is injected in a mist-like state from the end of the compression stroke, that is, from slightly before the crank reaches top dead center, to the beginning of this stroke, and ignites spontaneously upon contact with the high-temperature air. The fuel undergoes explosive combustion within the cylinder, and the rapid expansion force of the combustion gas pushes the piston down, which, via the connecting rod, becomes the rotational force of the crankshaft. This stroke is called the combustion stroke or power stroke.

(D) Exhaust Stroke (See Figure 2-3(1)) If the exhaust valve E is opened, the combustion gas is discharged into the atmosphere as the piston rises past bottom dead center, and the discharge is completely finished when the piston reaches top dead center. In the combustion stroke, slightly before the piston (P) reaches the bottom dead center of the crank, it opens with the cam.

[Diagram of 4-Stroke Engine Indicator Diagram]

During the four strokes (two reciprocations) of the piston (P), the crankshaft rotates twice, and the power stroke during this time occurs only once.

Figure 2-4 shows the indicator diagram (PV diagram) of a 4-stroke engine. This diagram represents the state change of the gas inside the cylinder when the gas is introduced into the cylinder and the piston is pushed sequentially from position A to position B, or conversely, when the piston is pushed from position B to A by the expansion force of the gas. In general, pressure is represented by P on the vertical axis, and volume is represented by V on the horizontal axis, and the relationship between the two (the change in gas volume and pressure inside the cylinder) is shown in the diagram.

If the volume when the piston is at A is  $V_1$  and the pressure is  $P_1$ , then when the piston is at B, the volume becomes  $V_2$  and the pressure is represented by  $P_2$ . This diagram is called the PV diagram or indicator diagram.

