

-28- The temperature becomes high enough to exceed the ignition point of the fuel.

(C) Combustion Stroke (See Figure 2-3) With the intake valve S and the exhaust valve E closed, fuel, pressurized by the fuel injector into a mist, is injected from just before the end of the compression stroke (i.e., just before the crank reaches top dead center) to the beginning of this stroke. Upon contact with the high-temperature air, the fuel spontaneously ignites. 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)) With the exhaust valve E opened, as the piston rises past bottom dead center, it exhausts the combustion gas into the atmosphere, completing the exhaust process when it reaches top dead center. In the combustion stroke, the cam opens the exhaust valve E slightly before the piston (P) reaches bottom dead center of the crank.

[Diagram of 4-Stroke Engine] (A) Intake Stroke (B) Compression Stroke P: Piston P1 V2 V1 S: Intake Valve E: Exhaust Valve

Figure 2-4: Indicator Diagram of a 4-Stroke Engine

As described above, the crankshaft rotates twice during the piston's (P) four strokes (two reciprocations), and the power stroke occurs only once during this period.

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



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