-28- ...resulting in a high temperature exceeding the fuel's ignition point.

(C) Combustion Stroke (See Figure 2-3)

With the intake valve S and exhaust valve E closed, high-pressure fuel, atomized by the fuel injector, is injected slightly before the end of the compression stroke (i.e., just before the crank reaches top dead center). This injected fuel comes into contact with the high-temperature air and auto-ignites. The fuel undergoes explosive combustion within the cylinder, and the rapid expansion force of the combustion gas pushes the piston down, which is converted into rotational force of the crankshaft via the connecting rod. This stroke is called the combustion stroke or power stroke.

(D) Exhaust Stroke (See Figure 2-3)

With the exhaust valve E open, as the piston rises past bottom dead center, it expels the combustion gases into the atmosphere, completing the exhaust process when it reaches top dead center. In the combustion stroke, slightly before the piston (P) reaches bottom dead center of the crank, the cam...

[Diagram Labels - Organized Coherently]

(A) BOS P Explosion PP2 B Exhaust Stroke Intake Stroke P1 V2 (1) SA →V1 Piston Stroke Stop

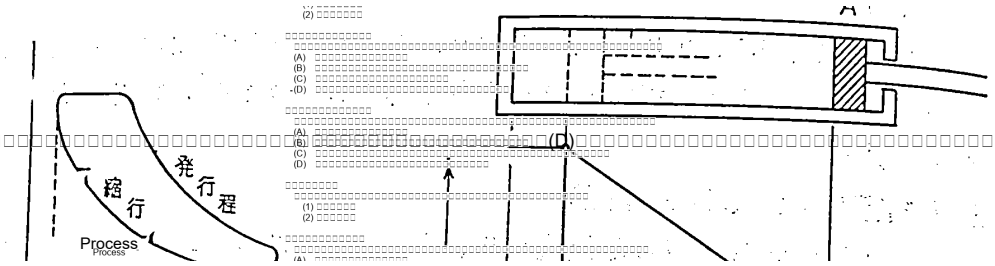

Figure 2-4: Indicator Diagram for 4-Stroke Engine

As described above, the crankshaft makes two rotations 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) for a 4-stroke engine. It illustrates the state change of the gas inside the cylinder when gas is introduced into the cylinder and the piston is pushed 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. In general, pressure is represented by P on the vertical axis and volume is represented by V on the horizontal axis. The diagram illustrates the relationship between these two (the change in gas volume and pressure inside the cylinder).

If the volume when the piston is at A is V1 and the pressure is P1, then the volume when the piston is at B is V2, and the pressure is represented by P2. This diagram is called the PV diagram

or indicator diagram.