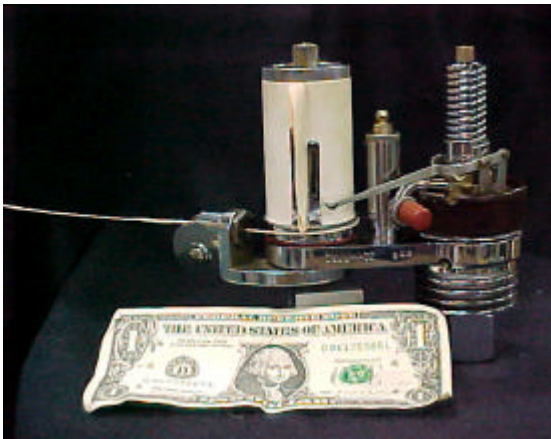


“What does that Do?” ... (1) The Engine Indicator by Mike Penberth

Every Run Day Pat Cox drags a large wooden box onto the floor of the engine house and opens it to reveal something that looks like one of Mr Edison’s early cylinder phonographs. “What is it?” many visitors ask. The response that it is an engine indicator still leaves many baffled. The function of this instrument is to draw a graph of the pressure in the engine cylinder against the cylinder volume. This is often called a P-V curve but was known as an indicator diagram when our engines were new.



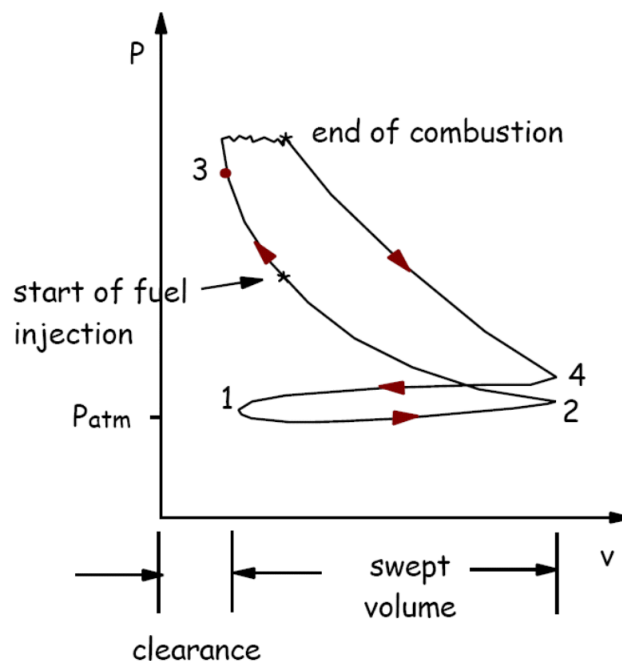
This picture is of a different type but shows the operating principal. A sheet of paper is wrapped around the drum to form the graph. The cord acts against an internal spring to rotate the drum. The cord is connected to the engine piston rod so that the drum rotates backwards and forwards with the motion of the piston. The position around the circumference of the cylinder now indicates the volume of the cylinder.

The pen arm is linked to a spring bellows that is connected through a pipe to a valve in the cylinder head. The pressure in the cylinder head moves the pen along the axis of the drum to complete our pressure volume graph.

The next question is “Why do we want this graph?” This graph to an engineer is what an electrocardiograph is to a doctor, it shows the engine’s heartbeat and can be used to diagnose problems such as leaking valves or incorrect timing.

Every type of heat engine including the domestic refrigerator has its’ own characteristic indicator diagram. Because these diagrams are closed curves they are called cycles and one way to get your name recorded for posterity was to come up with some new cycle, there may still be an opportunity, who knows?

The diagram below shows the indicator diagram for a four stroke compression ignition engine such as the single cylinder Ruston.



These mechanical engine indicators were very useful in the early days of engine development when engine speeds were very low but had to give way to more modern devices as engine speeds rose. The P-V curve, however, is still at the heart of new engine development.