# horsepower

The standard definition for horsepower from days of old is the amount of power to lift 33,000 pounds 1 foot in one minute.
When steam was the prime motive power in the mid 1800's to the early 1900's there was and still is a calculation for the horsepower of a steam engine which is HP = (PLAN)/ 33,000 where P = effective mean pressure in the cylinder in psi. Note, this is NOT the operating pressure of the boiler. L = length of stroke in feet, A = the area of the piston in square inches and N = RPM of the engine. If an engine is double acting, then the HP is twice that of a single acting engine.
Steam is very unique it that it expands many times its volume when released. A steam engine uses this principle to generate its amazing power.
The steam is admitted into the cylinder at the top of the piston stroke and as the piston starts to move, the steam is shut off sometime during the stroke and the expansive characteristics of the steam does the work. Because of this, the pressure in the cylinder is not constant and decays throughout the stroke. The average mean pressure in the cylinder is what is necessary to calculate the HP of the engine and it cannot be determined just with a pressure gauge.
An amazing instrument was invented to measure and record the actual pressure in the cylinder during its operation. It is nothing more that a complex pressure recorder.
It consists of a piston connected to the engine cylinder, a drum with a chart on it and the drum is mechanically connected to the piston crosshead with a string such that one full stroke of the engine equals one revolution of the drum. The drum is spring loaded as to rotate back and forth with the stroke of the engine.
Depending on the initial pressure and type of engine, the piston has a series of springs fitted so the maximum pressure in the cylinder will only move the pen the height of the chart paper. The indicator kits have a number of different springs that are interchanged for different pressures.
Some indicators have springs external for easy change out, some had the springs on top of the piston which required the top cap and piston be removed to change the spring and one very uncommon indicator has long leaf spring and the spring can be captured along its length for different pressures.
Some indicators are fitted with reducing motions so a long stoke engine can be measures yet the drum rotation can be adjusted accordingly by a set of pullies.
After the chart is drawn, the total area under the curve, IE effective pressure is manually calculated and then the HP of the engine can be calculated.
Here are three typical indicators with a brief description of the chart.
These indicators also determined valve timing, leaks and problems.
These indicators also changed to be used with slow speed diesel engines but were not as effective. [anon]

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### Keely

Keely announced in 1888 that he had proved the uselessness of building engines to employ the ether as a motive power, which could only be used as a medium for the power which he had discovered, namely a condition of sympathetic vibration associated both positively and negatively with the polar stream. The revolving globe was never created to be the "source of power" and Keely never affirmed that he could produce with it "*an indefinite amount of **horse power** without current expense.*" [Snell Manuscript - The Book, page 3]

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### Schauberger

The amount of energy lost when a river discharging about 500 m3/sec is warmed to about +22°C (+72°F) amounts to about 45 million kilowatts or 57 million **horsepower** per second. [The Energy Evolution - Harnessing Free Energy from Nature, The Transport of Ore in Double-Spiral-Flow Pipes]