6 THEORY

6.1 Introduction.

The Internal Combustion (IC) engine is still today the predominant prime mover for a host of reciprocating machines therefore, is that the area of the small anticlockwise loop must be subtracted from the area of the main diagram to determine *Indicated mean effective pressure* [illegible]

and with the same length as the [illegible] diagram (L). The [illegible]

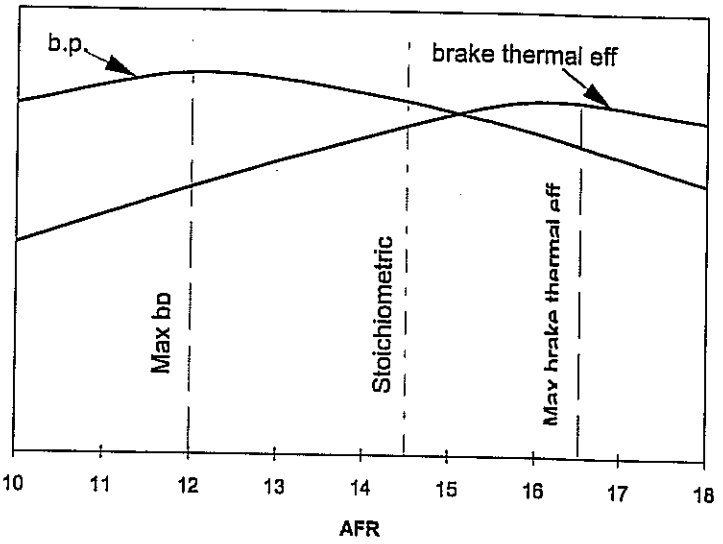
$$\text{b.p.} = \frac{2 \times \Pi \times N \times T}{1000} \quad \text{kW} \qquad \text{(ii)}$$

(8)

where the engine speed N is in rev/sec. It can be seen from equations (i) & (ii) that Torque and

b.p. are directly proportional and can be related by the following [illegible]

Effect of mixture strength on performance



As can be seen from the graph one way to regulate the power output would be to change the mixture AFR, however reliable ignition by spark is only case if it were capable of burning stoichiometric ratio's. This results in CI engines being generally larger and heavier than SI engines although the former has a higher thermal efficiency.

It is found that very weak mixtures can be ignited and burnt in a CI engine so that it is possible to govern power output by varying fuel supply. Although this results in a increase in indicated thermal efficiency at part load, the fall in mechanical efficiency more than outweighs this effect, and the brake thermal efficiency always falls off. Nevertheless the reduction in efficiency with decrease in load is not so marked as in SI engines. Governing the power output by varying the mixture is usually referred to as *Quality governing*.

6.4 Engine performance characteristic.

greater increase in power can be obtained by compressing the charge prior to induction with some type of *Supercharger*. A Roots blower or centrifugal compressor is normally used for this purpose, the former gear driven from the crankshaft, whilst the latter obtaining its power from turbine driven from the exhaust gases, and is termed a *Turbocharger*. Although the net increase in power obtained from supercharging or turbocharging can be quite considerable, it has little effect on brake thermal efficiency, as the fuel must be increased in proportion to the air charge to maintain the required AFR.

FIGURE 2 ALTERNATOR EFFICIENCY CURVES