triangle (Fig. 7.2). The vessel's course reversed and the relative wind direction are plotted relative to true north, using the vessel as the focal point of the triangle. The length of each line is scaled to represent speed. The third side of the triangle gives the true wind direction and speed.

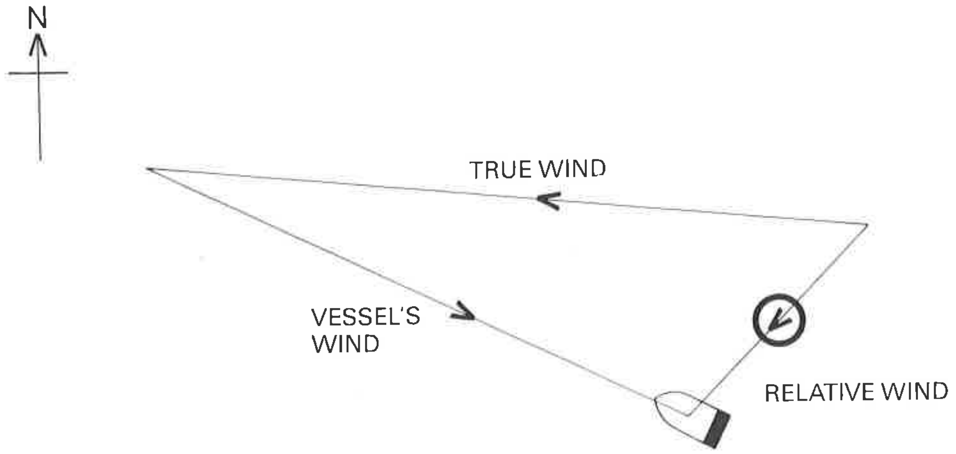

Fig. 7.2 True wind vector triangle.

If there is no relative wind, the vessel's course and the speed reversed is the same as the true wind direction and speed (Relative Wind—00: Course 090°(T)—10 knots: True Wind 270°(T)—10 knots).

If the relative wind is from the bearing on which the ship is steering, the direction of the true wind is the vessel's course, and its speed is the difference between the vessel's speed and the relative wind speed (e.g. Relative Wind 270°(T)—20 knots: Course 270°(T)—10 knots: True Wind 270°(T)—10 knots).

The siting of wind vanes and anemometers on a vessel pose problems in providing a free flow of air. The standard height of 10 metres is rarely practicable if the effect of the superstructure is to be avoided, and a compromise has to be accepted, with the consequent inaccuracy of readings on some bearings.

LARGE SCALE AIR FLOWS

Surface winds may be either large scale air flows associated with pressure systems (Chapter 8), or air flows associated with local conditions, or a combination of both. The observation and recording of atmospheric pressure enable the distribution of pressure over an area of the surface to be established (Chapter 2). The change of pressure over unit distance at right angles to the isobars is termed the *horizontal pressure gradient* (Fig. 7.3). The gradient is *steep* when the isobars are close together, and *slack* when they are far apart, both terms being used in a relative sense and without absolute values.

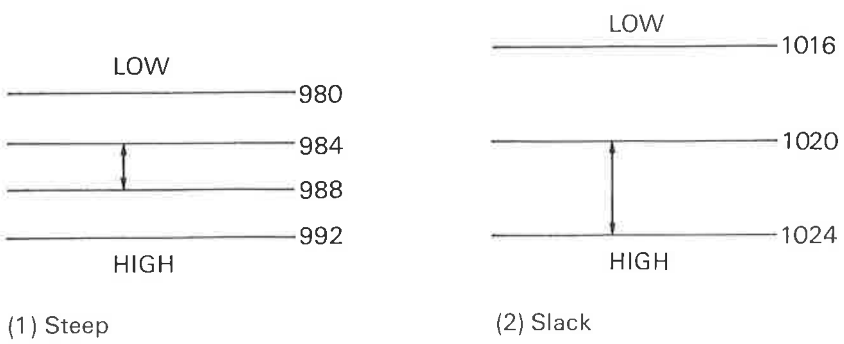

Fig. 7.3 Horizontal pressure gradient.