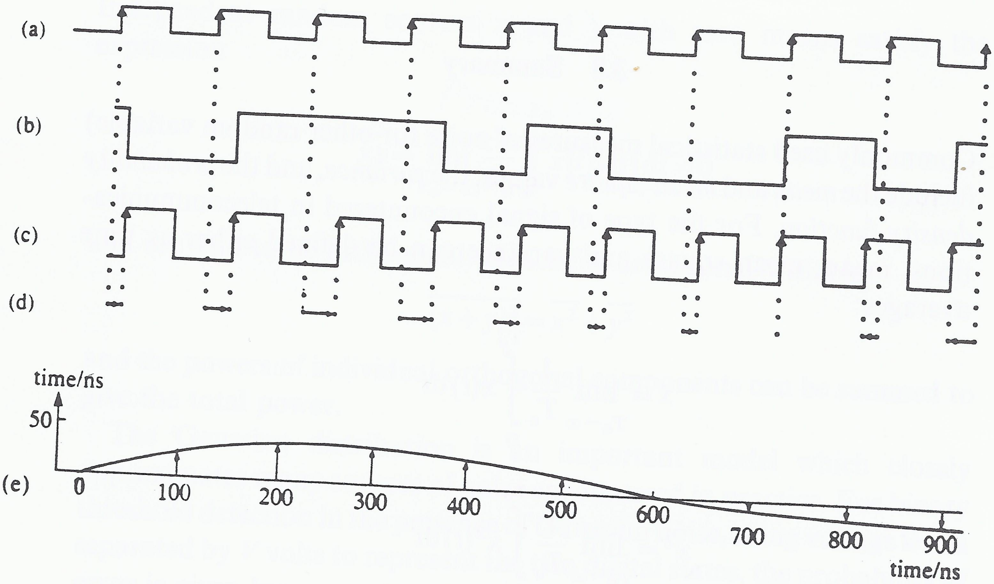

Fig. 3.24. Quantifying jitter.

Whether timing irregularities are viewed as jitter or wander depends upon the data signalling rate under consideration and the network characteristics. However, a typical boundary (for, say, a 64 kbits s^{-1} signal) would be about 20 Hz. Wander is often thought of as a varying d.c. timing error, whereas jitter is an a.c. timing irregularity. Formally, the boundary between wander and jitter is now defined as 10 Hz. (Plesiochronous networks were transparent to wander, but this is not the case for synchronous networks. Wander has therefore suddenly become much more of an 'issue', and the handling of wander in SDH and SONET is the subject of current research.)

to derive its spectrum, for example. A much simpler parameter, though, and one of particular practical importance, is the peak phase excursion resulting from jitter – that is, the difference between the peak negative excursion and the peak positive excursion, often known as the *peak to peak jitter*.

Instead of using time differences for the jitter measure, it can be normalised with respect to the clock period to give *unit intervals* (*UI*). So an amplitude of 1 UI would be an excursion in time equal to the period of the clock.

EXAMPLE

What is the peak jitter amplitude, measured in unit intervals, of the jitter on the waveform shown in Fig. 3.24?

Solution. The positive peak of the jitter (which occurs at around 200–300 ns) is about 40 ns. Since the clock period is 100 ns, this is 40/100 = 0.4 unit intervals.

As is described in Chapter 5, it is possible to build circuits to reduce the amount of jitter on a digital waveform. However, low frequency jitter is particularly difficult to remove. For this reason it is often treated separately from higher frequency jitter and referred to as *wander*.