Problem 7.22

For the noncoherent receiver of Fig. 7.29 to offer an identical performance to the noncoherent receiver of Fig. 7.18, the following conditions must be satisfied:

(i)   The bit-timing circuitry of both receivers must be equally accurate.

(ii)   The common bandwidth of the band-pass filter must occupy at the minimum the main spectral lobe of the incoming BFSK signal. As such, a reasonably good choice for this bandwidth is the reciprocal of $2T_b$, where T_b is the bit duration.

(iii)   With one band-pass filtered centred on f_1 and the other centred on f_2, the frequencies f_1 and f_2 must be separated from each other by at least $1/(2T_b)$.

These three conditions do not guarantee the exact equivalence of the two noncoherent receivers of Figs. 7.18 and 7.19, but, for all practical purposes, would assure identical performance.