Problem 6.23

From Eq. (4) in the solution to Problem 6.22 we see that the transfer function of the modified duobinary conversion filter (shown in Fig. 6.15) is zero at $f = 0$. Hence, unlike the ordinary duobinary conversion filter, the modified duobinary conversion filter can be used to handle single-sideband transmission of data.

Specifically, Fig. 1(a) depicts the proposed data transmission system. The transmitter consists of two functional blocks:

- Modified duobinary conversion filter, which transforms the incoming binary data into a new format whose spectrum has low-frequency content around the origin.
- Single sideband modulator, which upconverts the transformed data to the desired band occupied by the lower or upper sideband of the modulated wave.

Correspondingly, the receiver consists of two functional blocks (see Fig. 1(b))

- Single sideband demodulator.
- Detector, consisting of a rectifier followed by decision device, for recovering the original binary data stream.

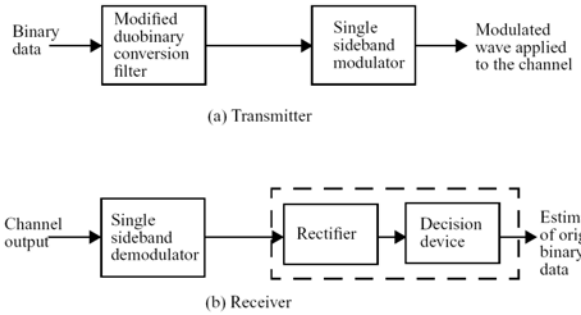

Figure 1