Appendix

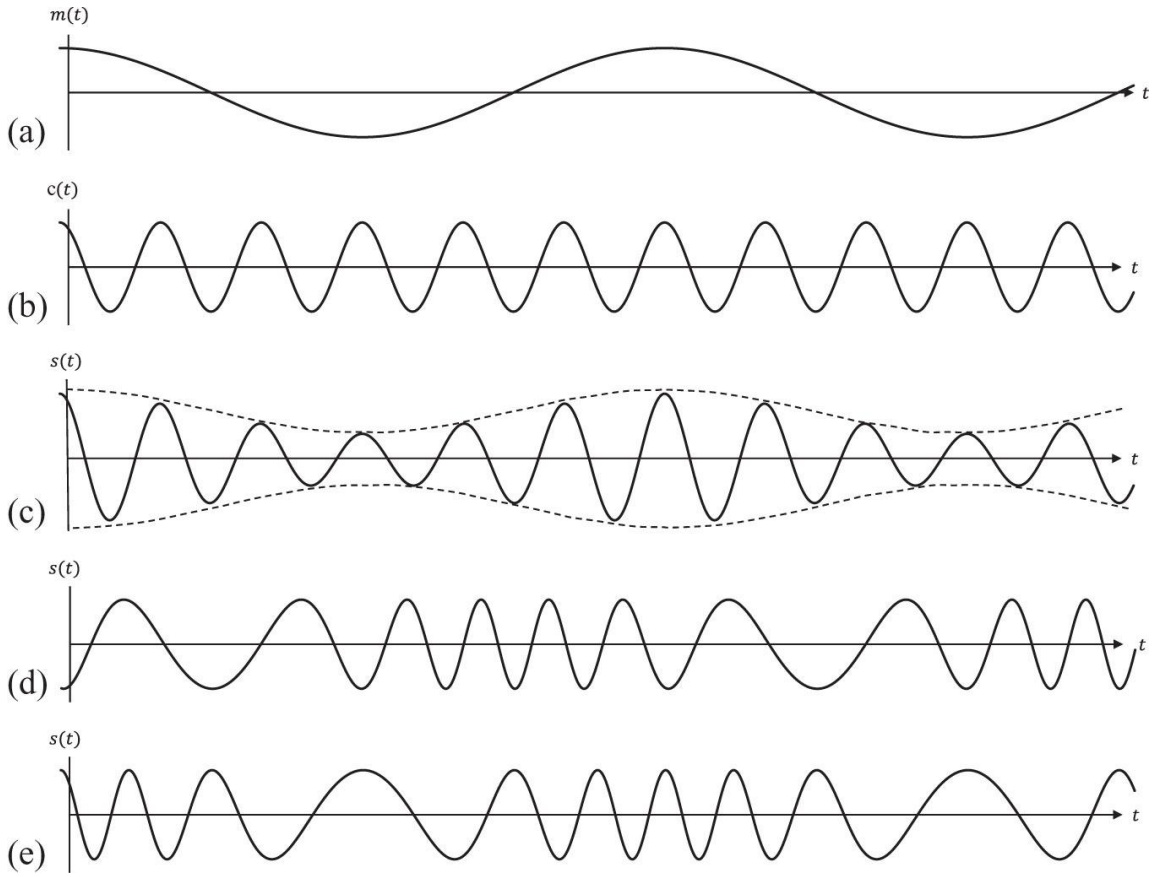

Figure A.1 CW modulation for a single tone: (a) sinusoidal modulating signal, (b) carrier wave, (c) amplitude modulated signal, (d) phase modulated signal, and (e) frequency modulated signal.

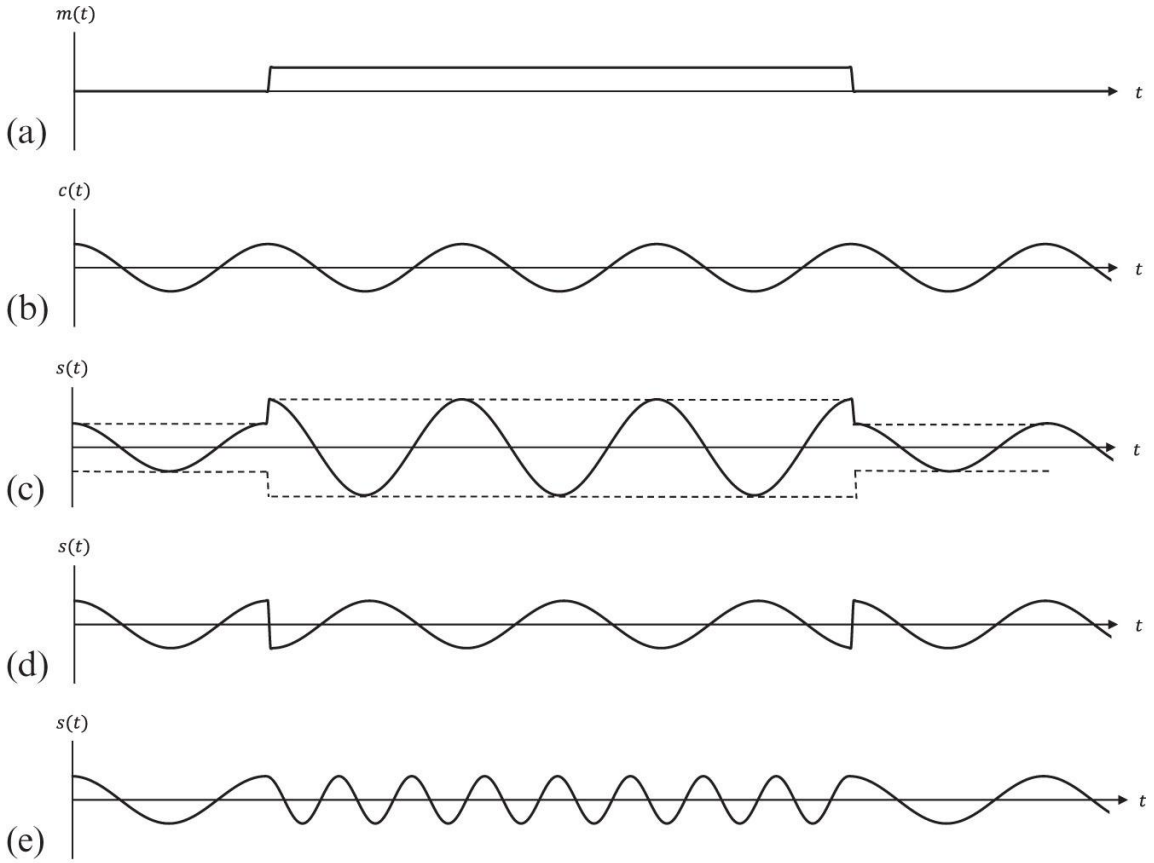

Figure A.2 CW modulation for a rectangular pulse: (a) rectangular modulating signal, (b) carrier wave, (c) amplitude modulated signal, (d) phase modulated signal, and (e) frequency modulated signal.

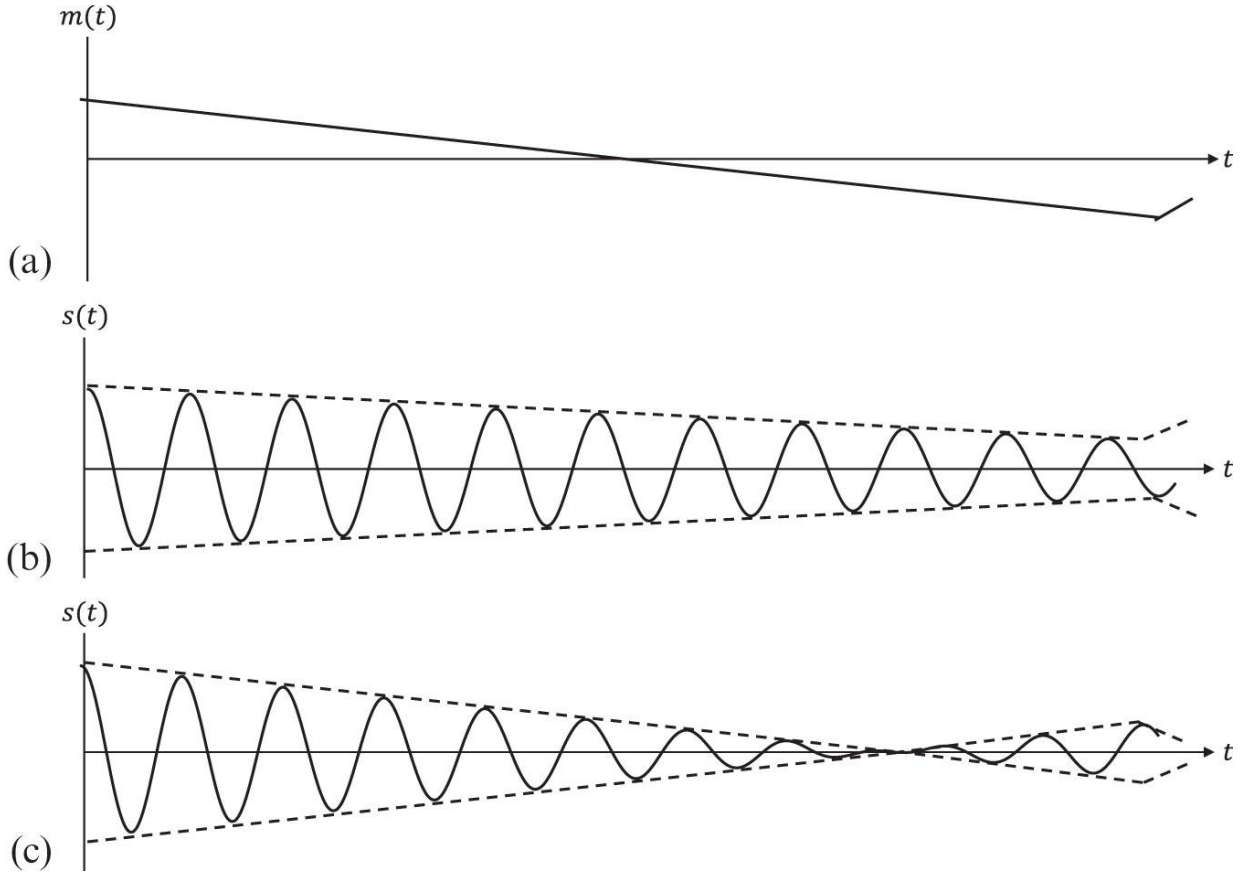

Figure A.3 DSB-PC-AM envelope: (a) modulating signal, (b) envelope is always positive, and (c) envelope is not always positive

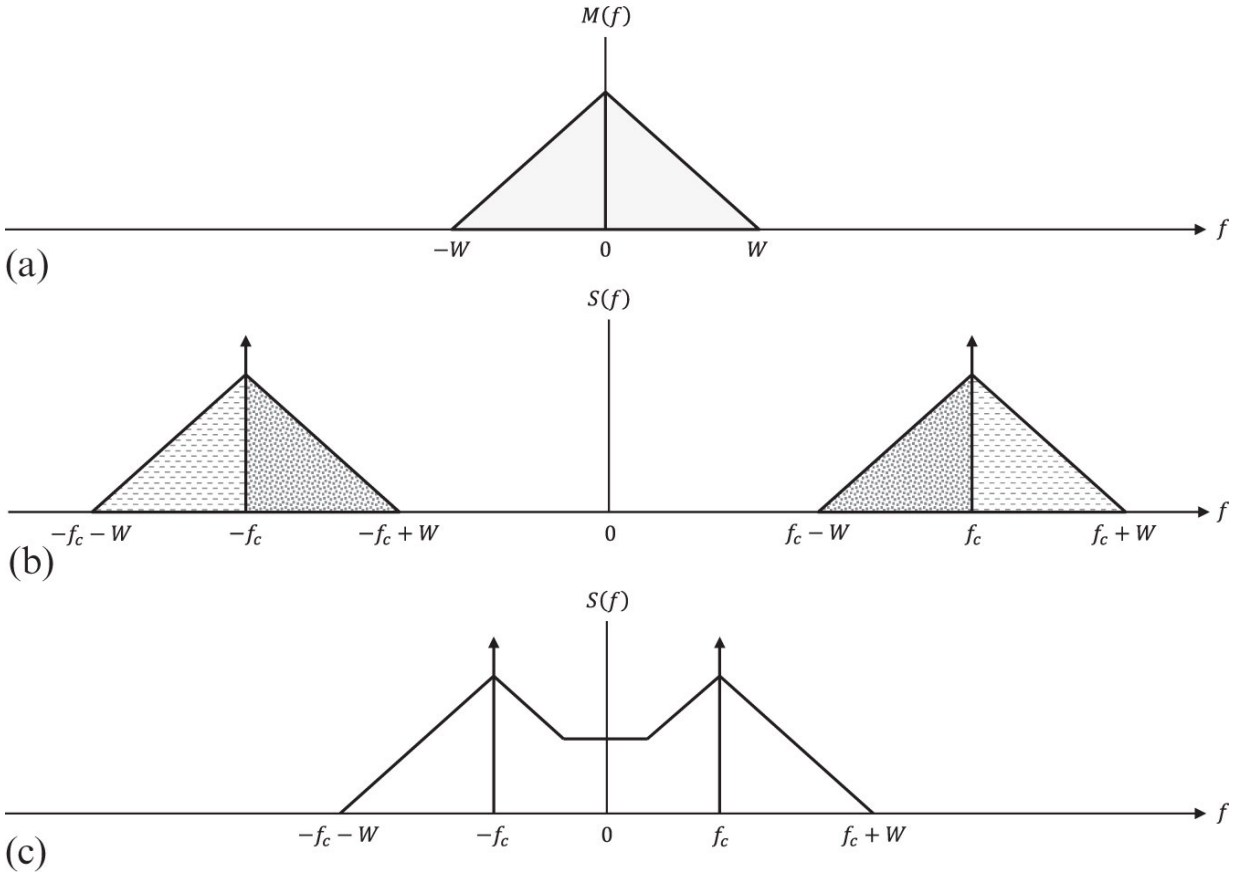

Figure A.4 Spectrum: (a) modulating signal, (b) DSB-PC-AM signal for fc >W, and (c) DSB-PC-AM signal for fc <W.

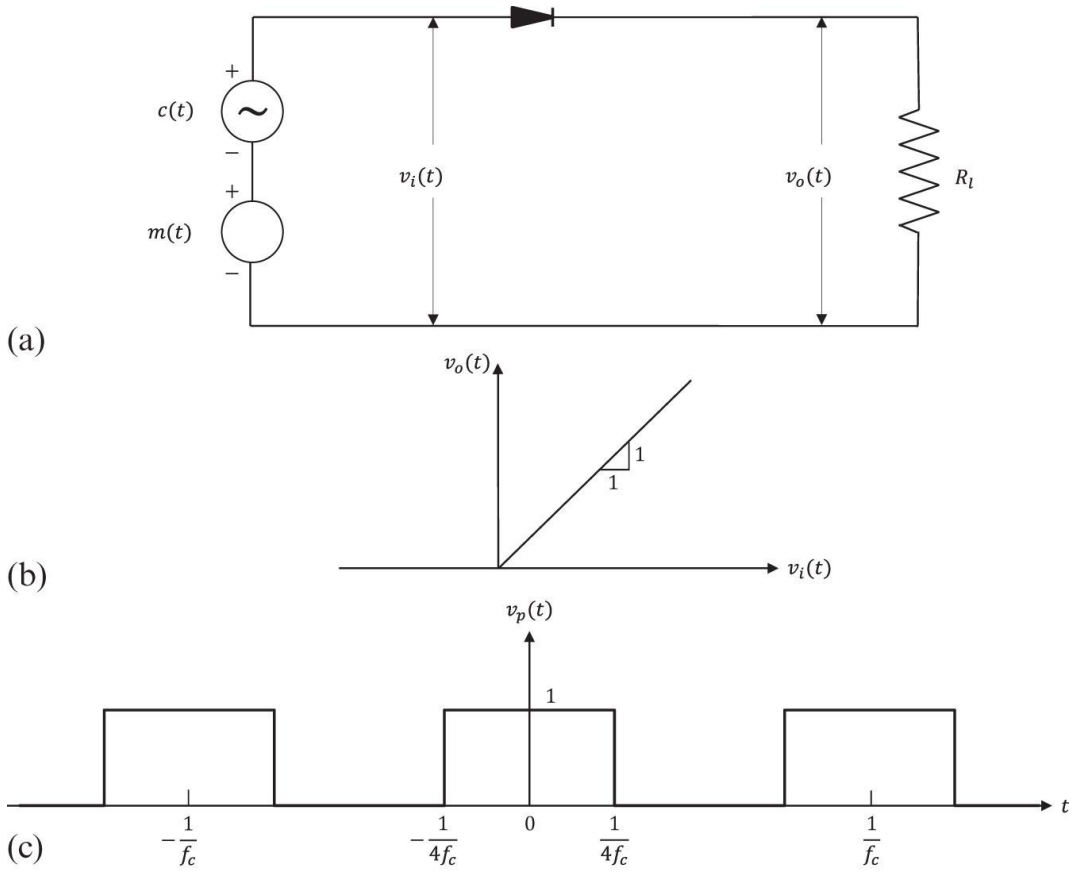

Figure A.5 (a) Switching modulator, (b) ideal diode input-output characteristic graph, and (c) periodic pulse train.

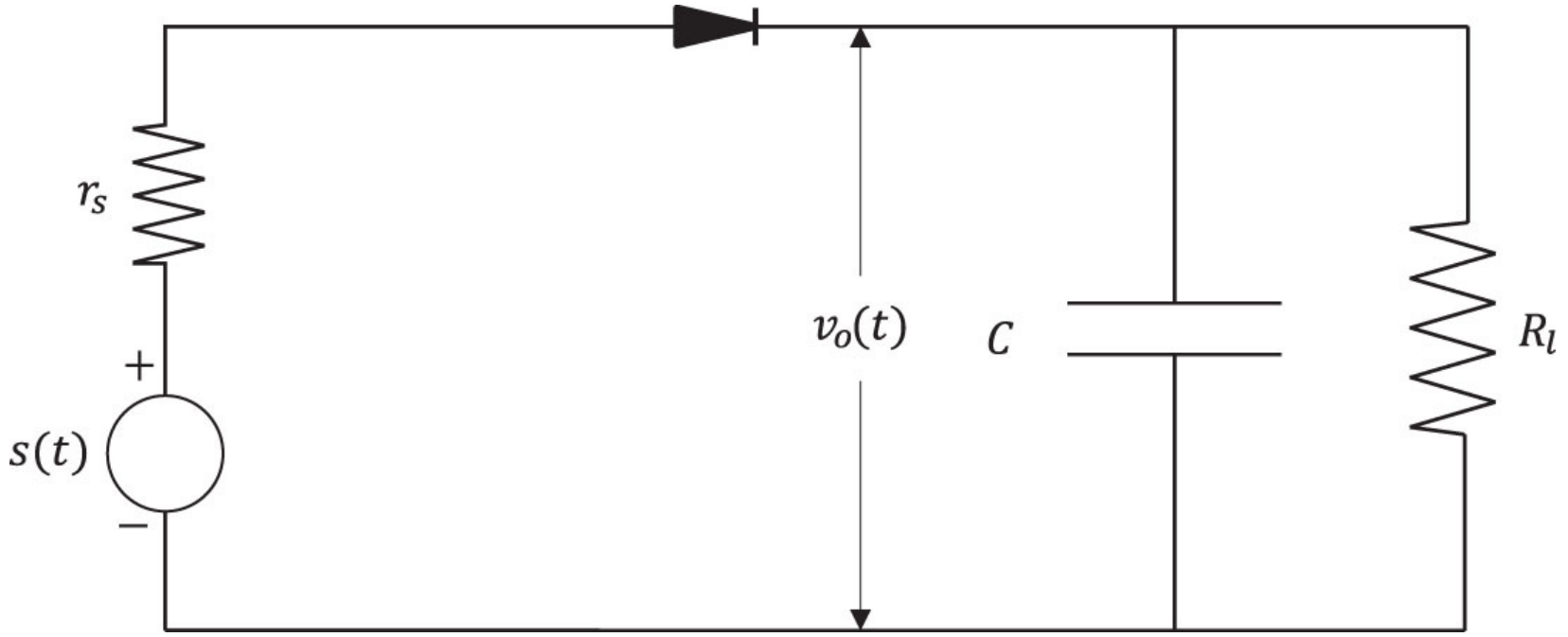

Figure A.6 Envelope detector.

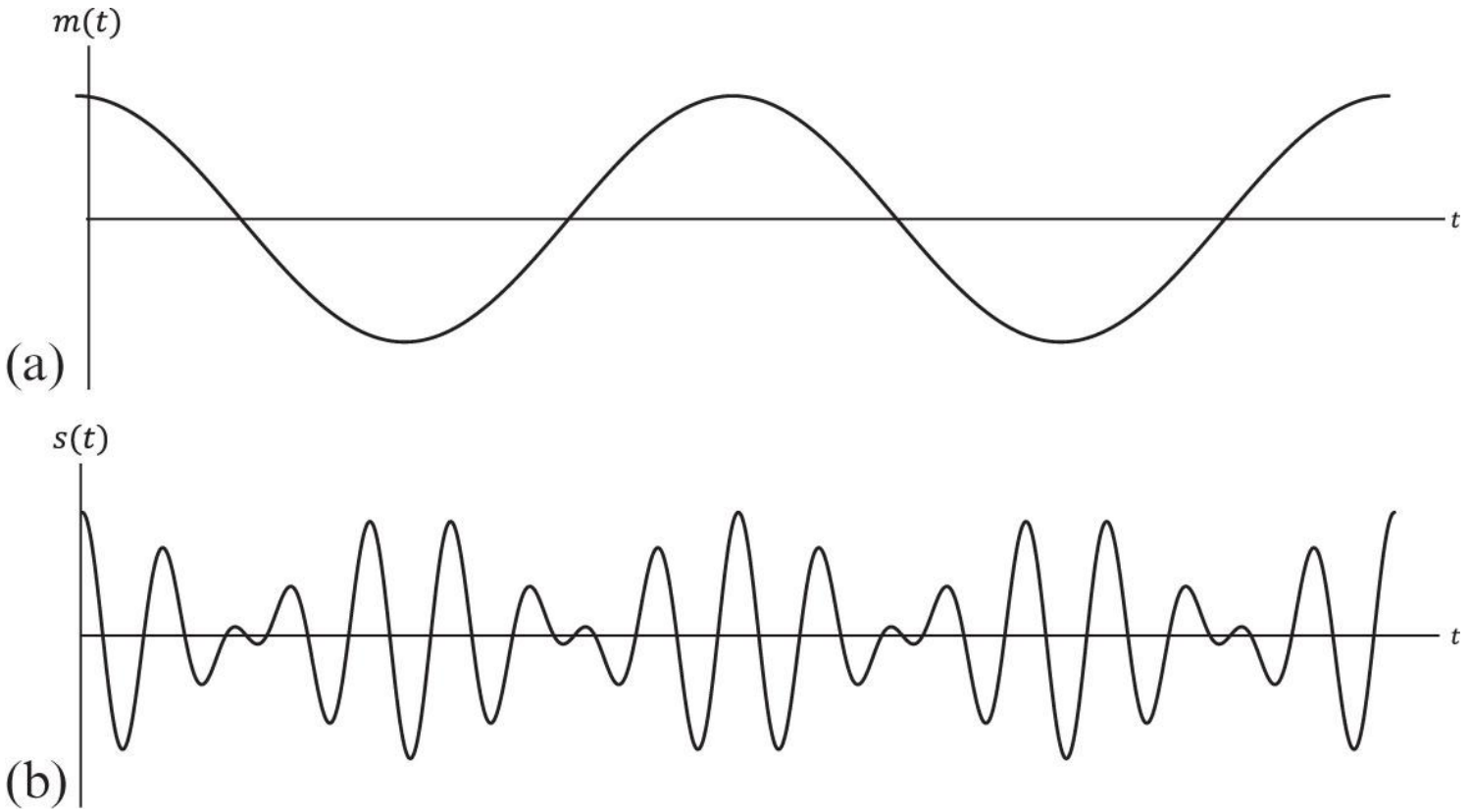

Figure A.7 DSB-SC AM: (a) modulating signal and (b) modulated signal.

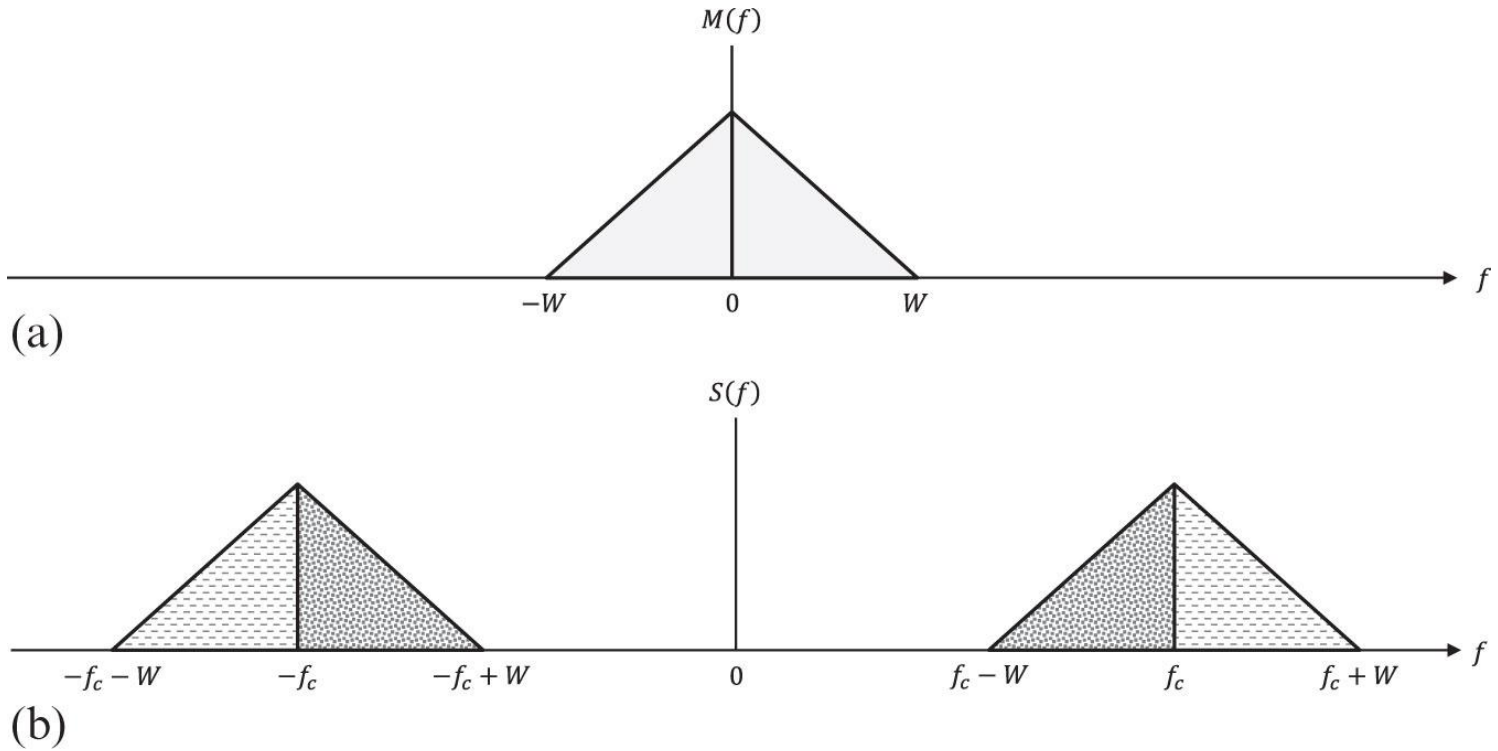

Figure A.8 Spectrum: (a) modulating signal and (b) DSB-SC-AM signal for fc >W.

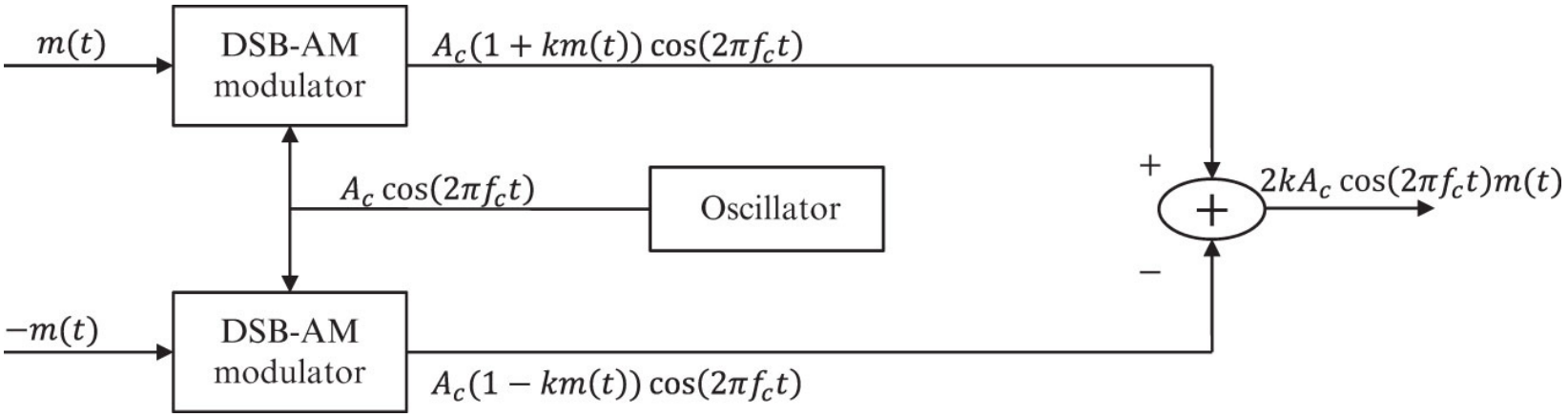

Figure A.9 Balanced modulator for DBS-SC AM.

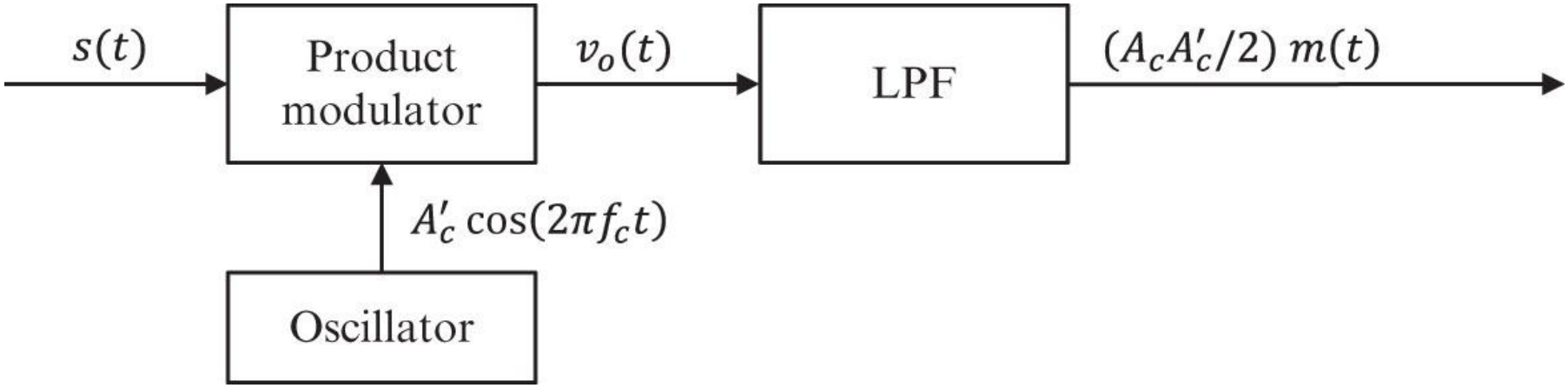

Figure A.10 Coherent detection of DSB-SC-AM signal.

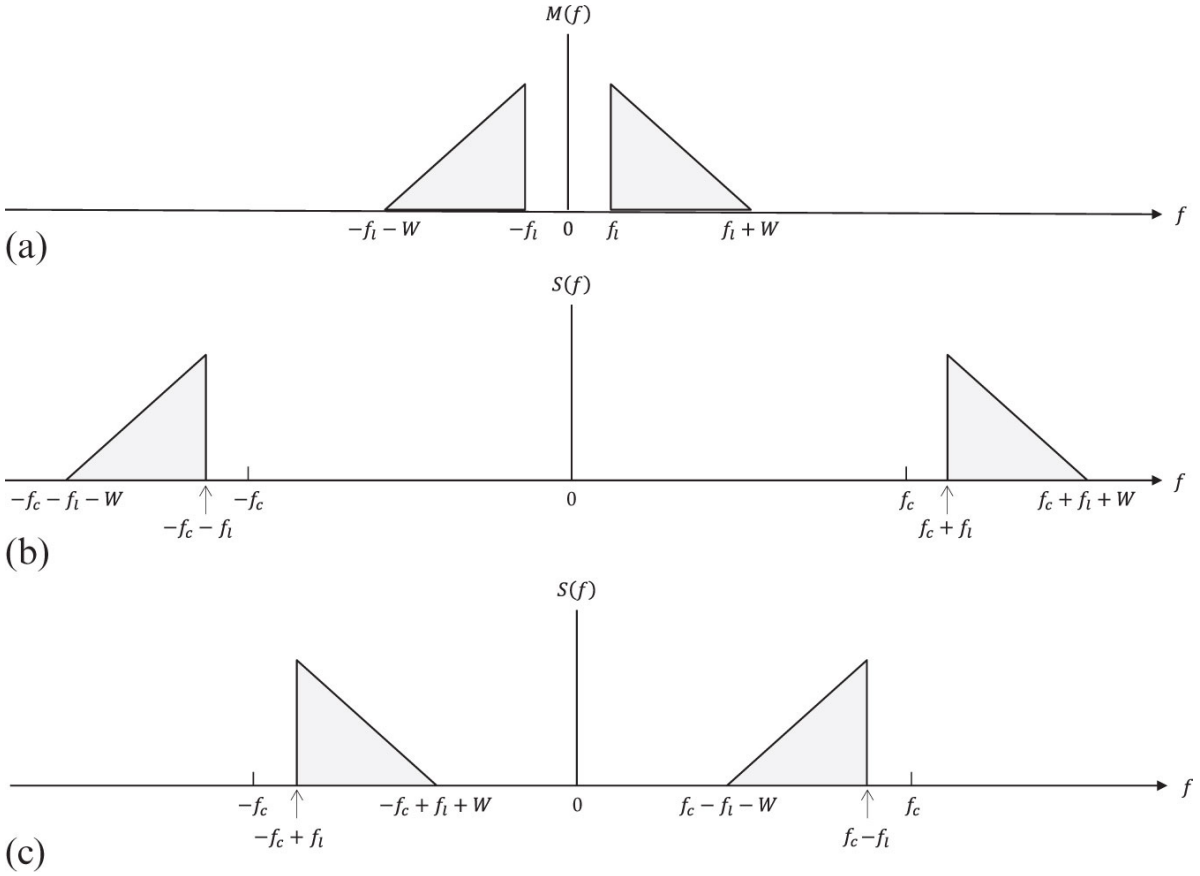

Figure A.11 Spectrum: (a) modulating signal, (b) SSB-SC AM (USB), and (c) SSB-SC AM (LSB).

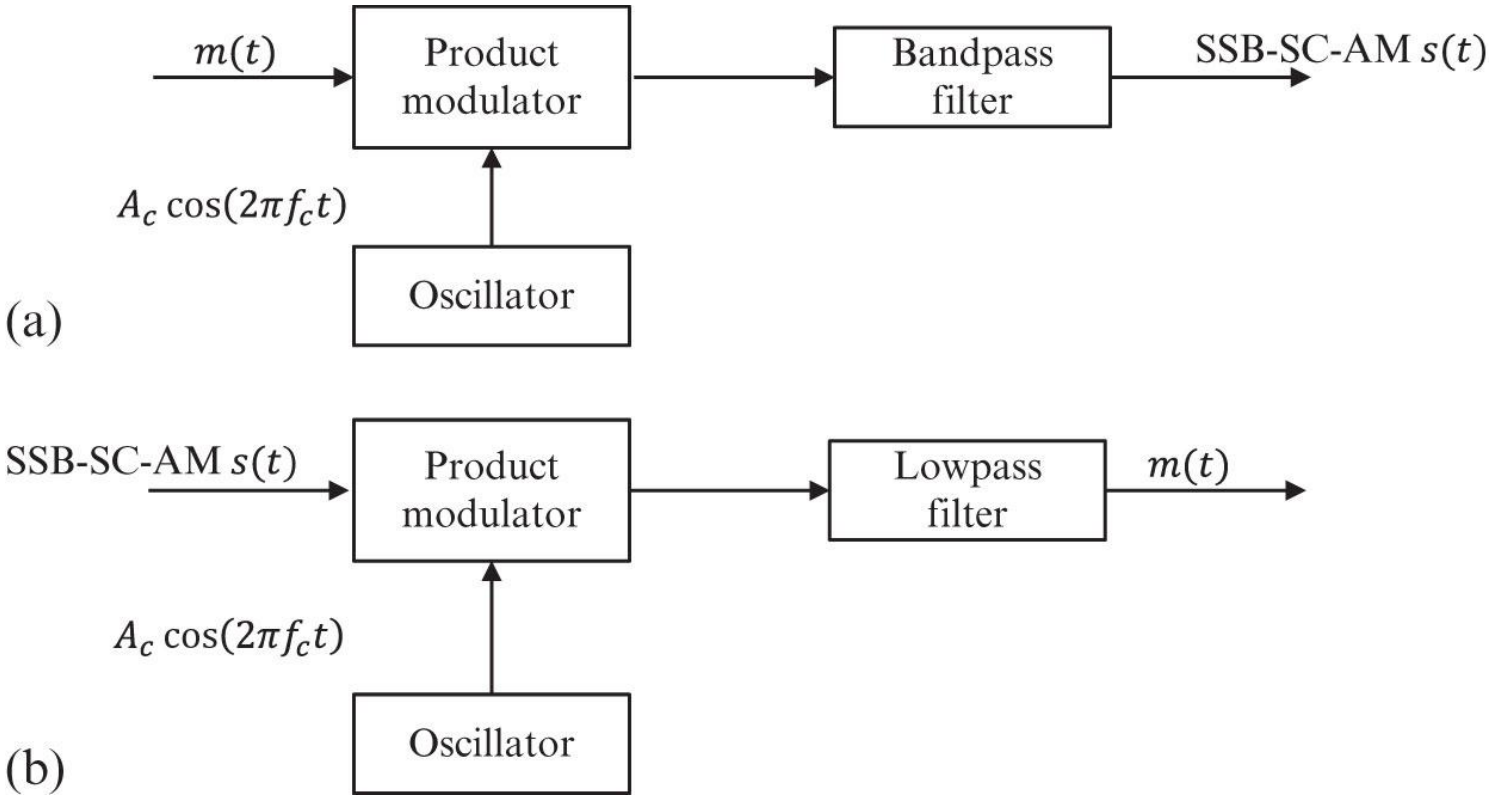

Figure A.12 SSB-SC AM: (a) modulator and (b) coherent demodulator.

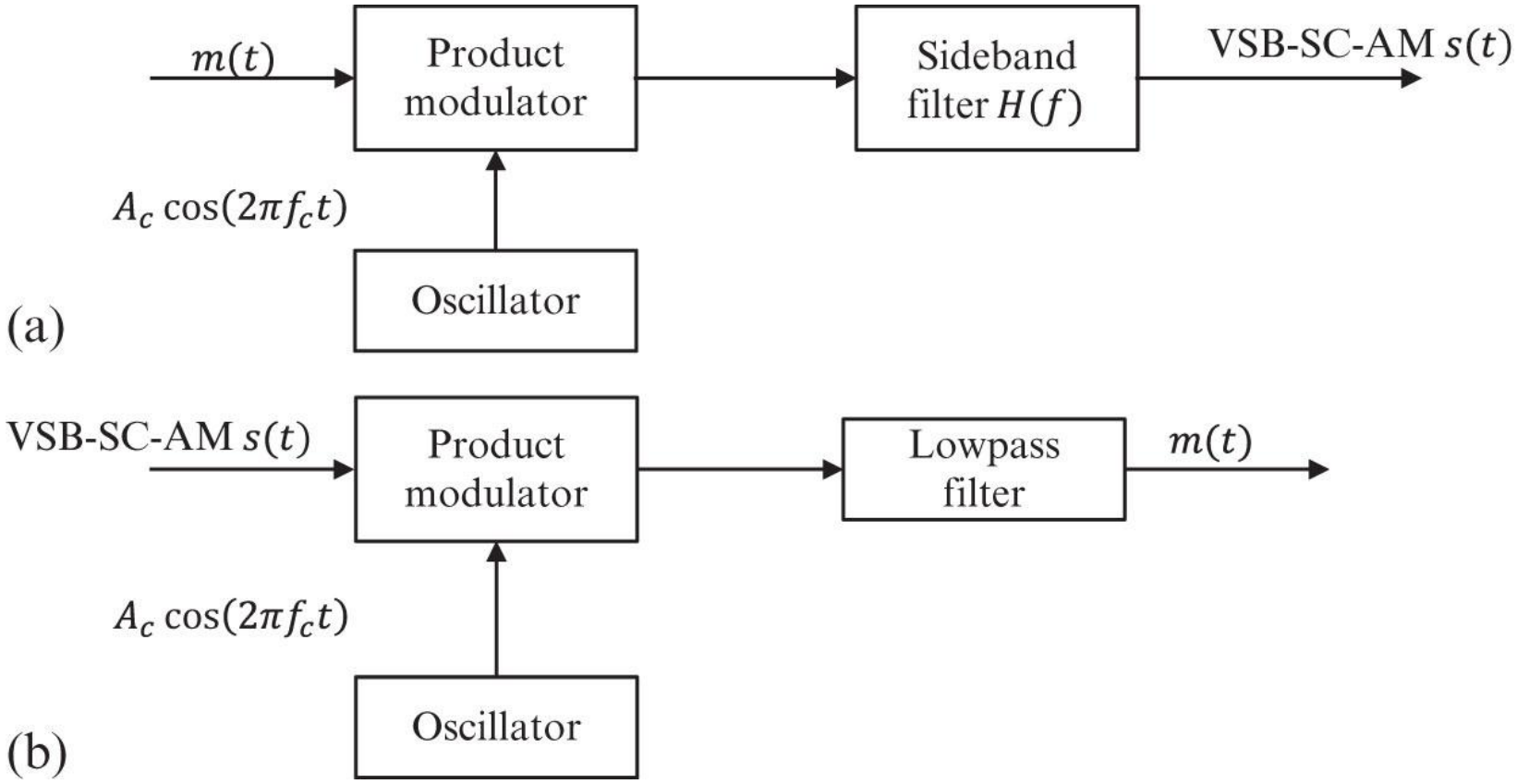

Figure A.13 VSB-SC AM: (a) modulator and (b) coherent demodulator.

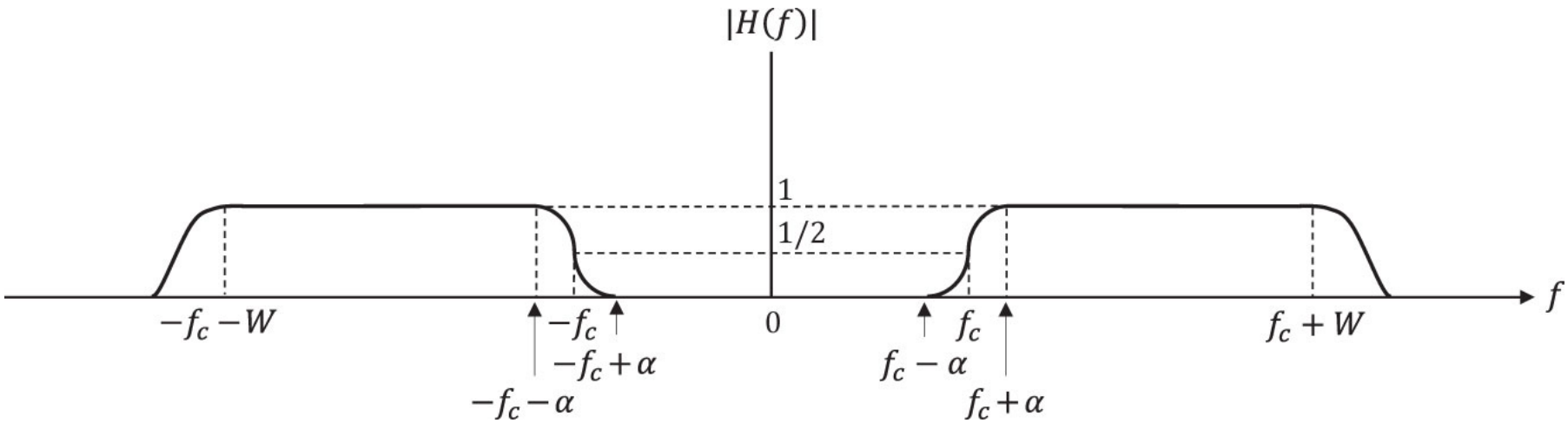

Figure A.14 Amplitude response of VSB-AM sideband filter for LSB.

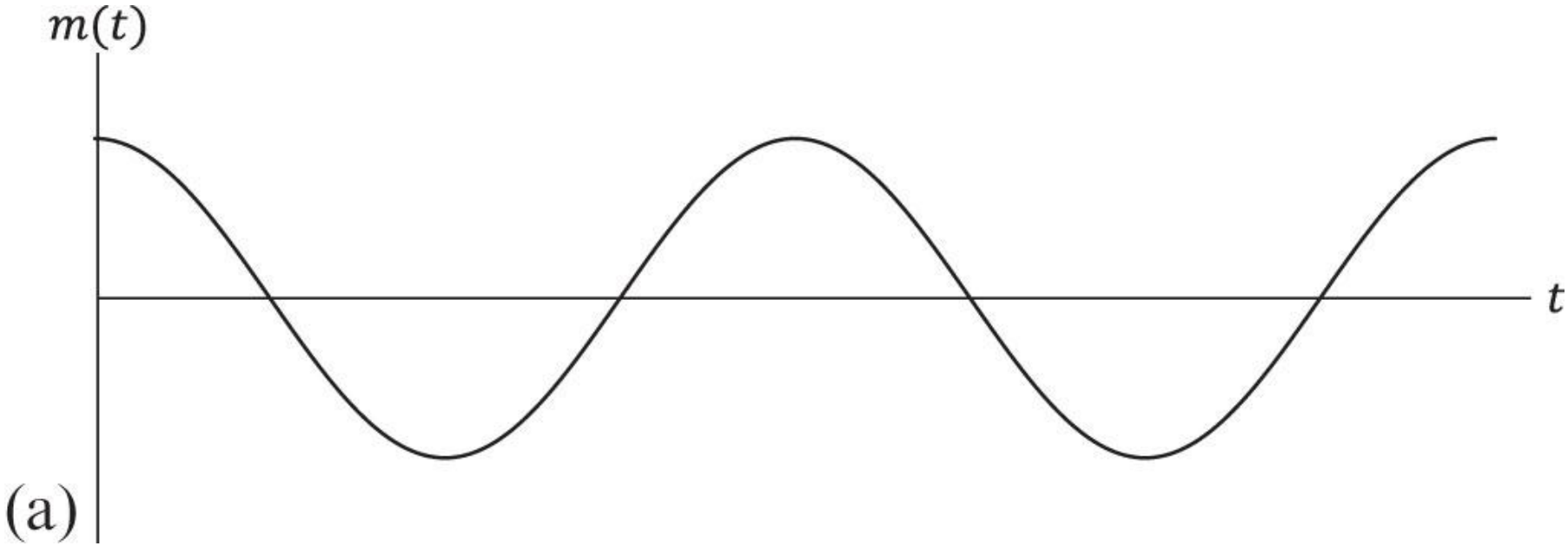

Figure A.15a Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

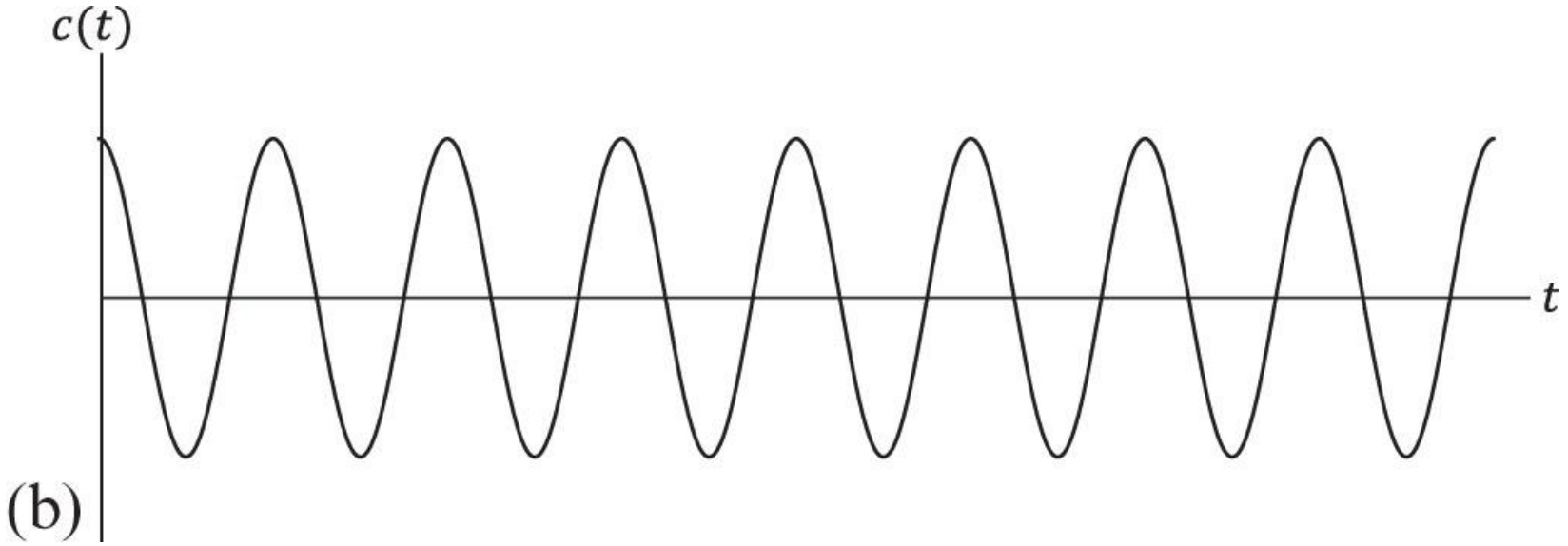

Figure A.15b Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

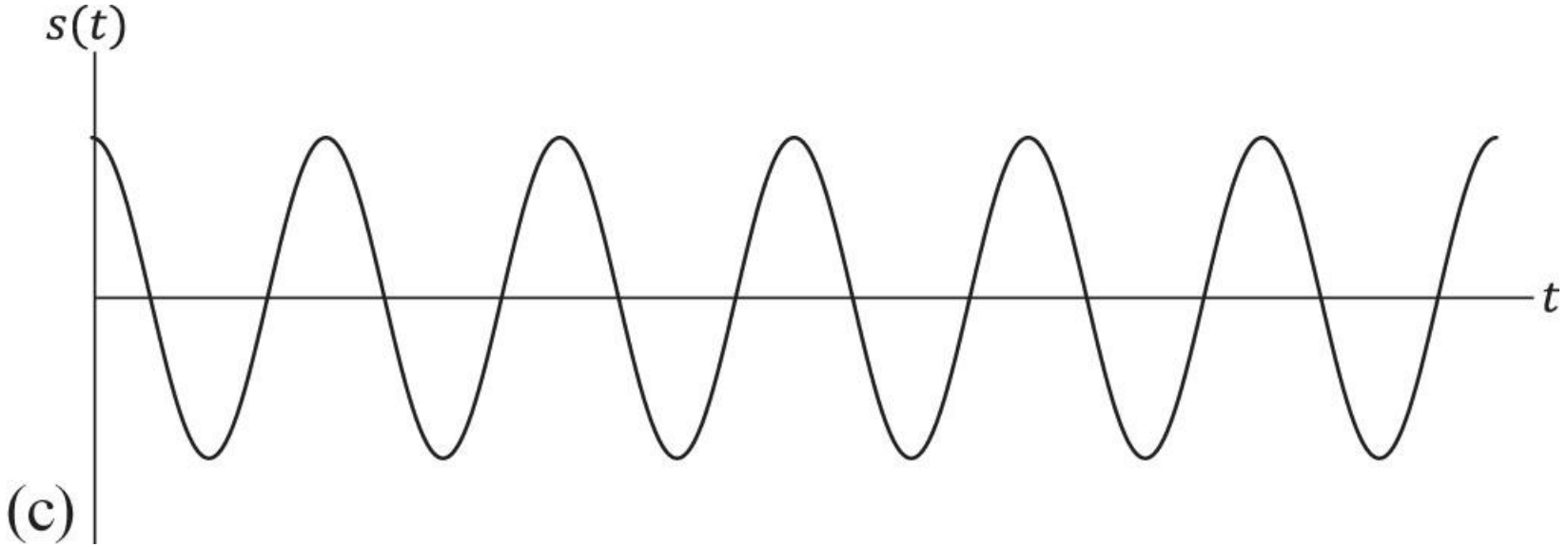

Figure A.15c Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

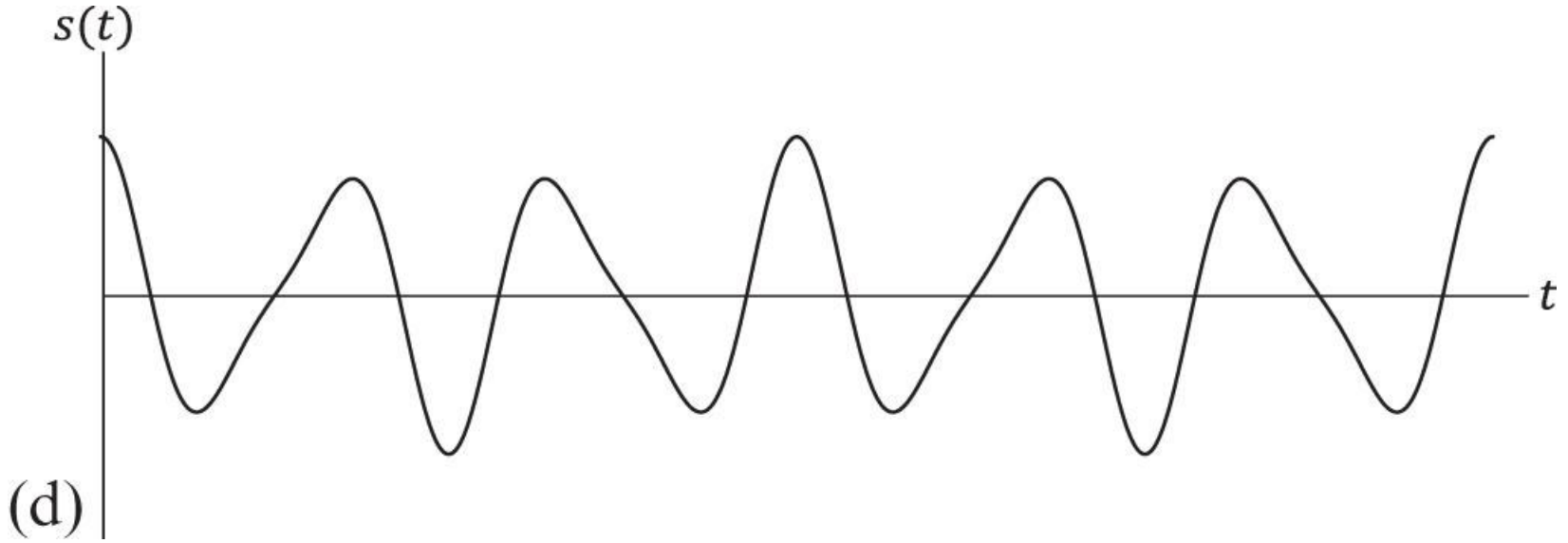

Figure A.15d Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

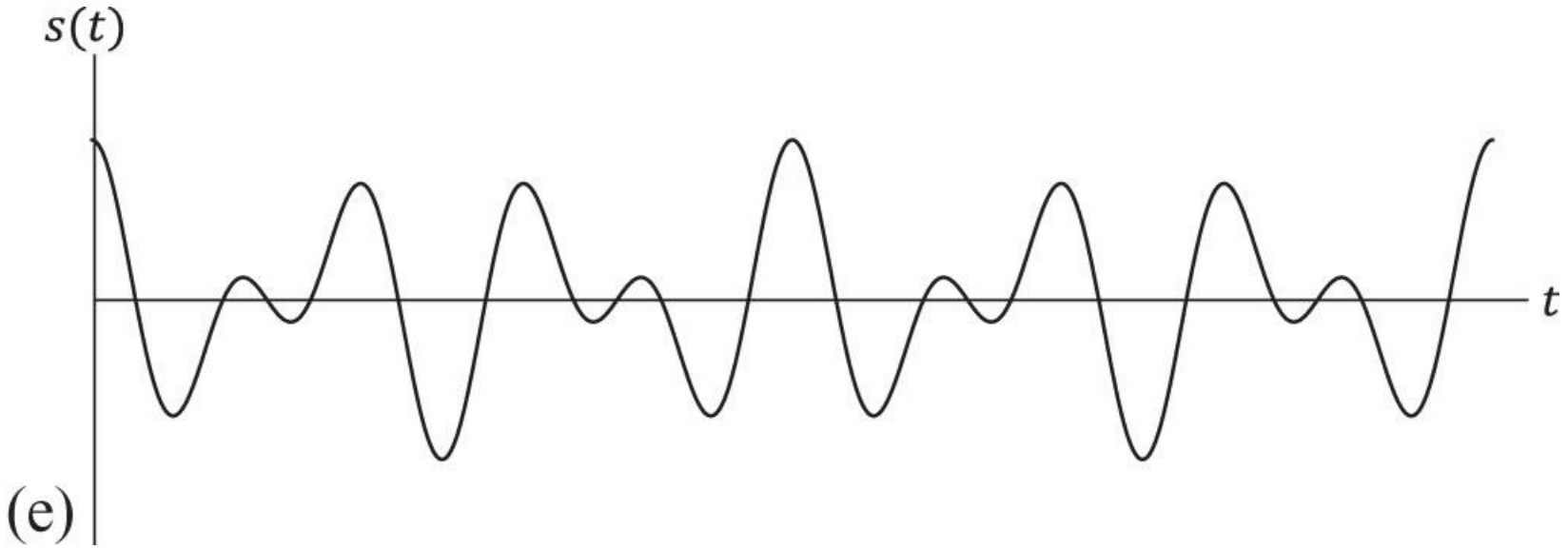

Figure A.15e Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

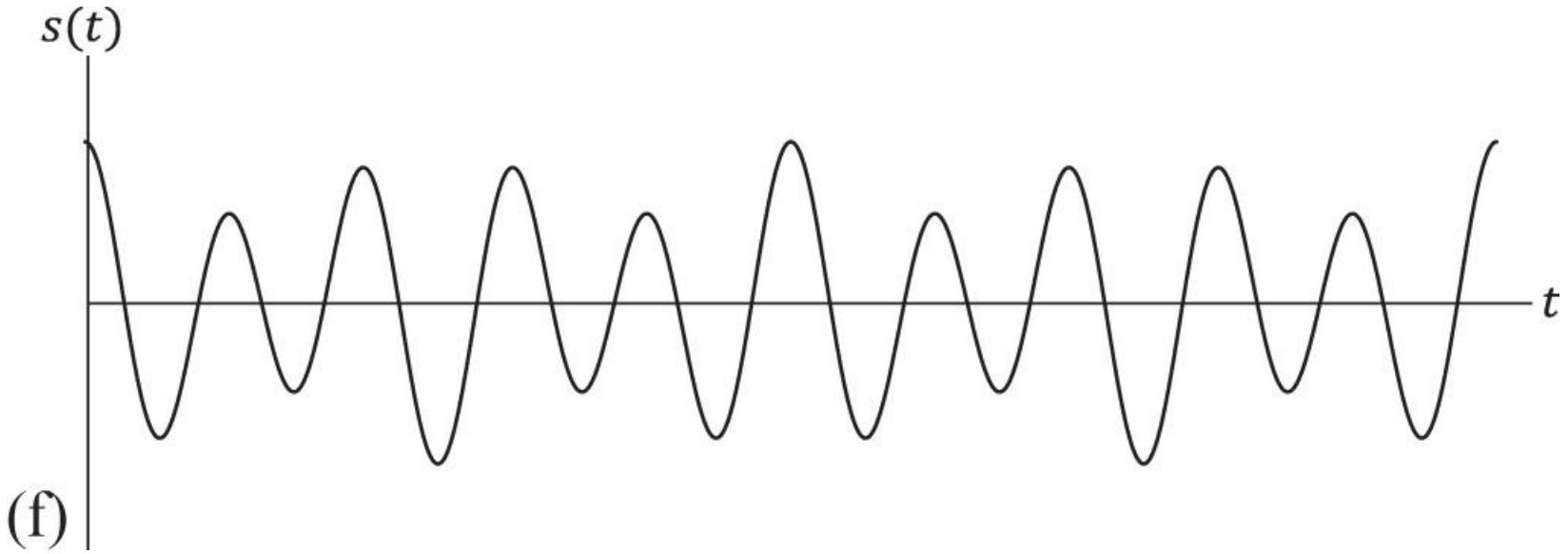

Figure A.15f Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

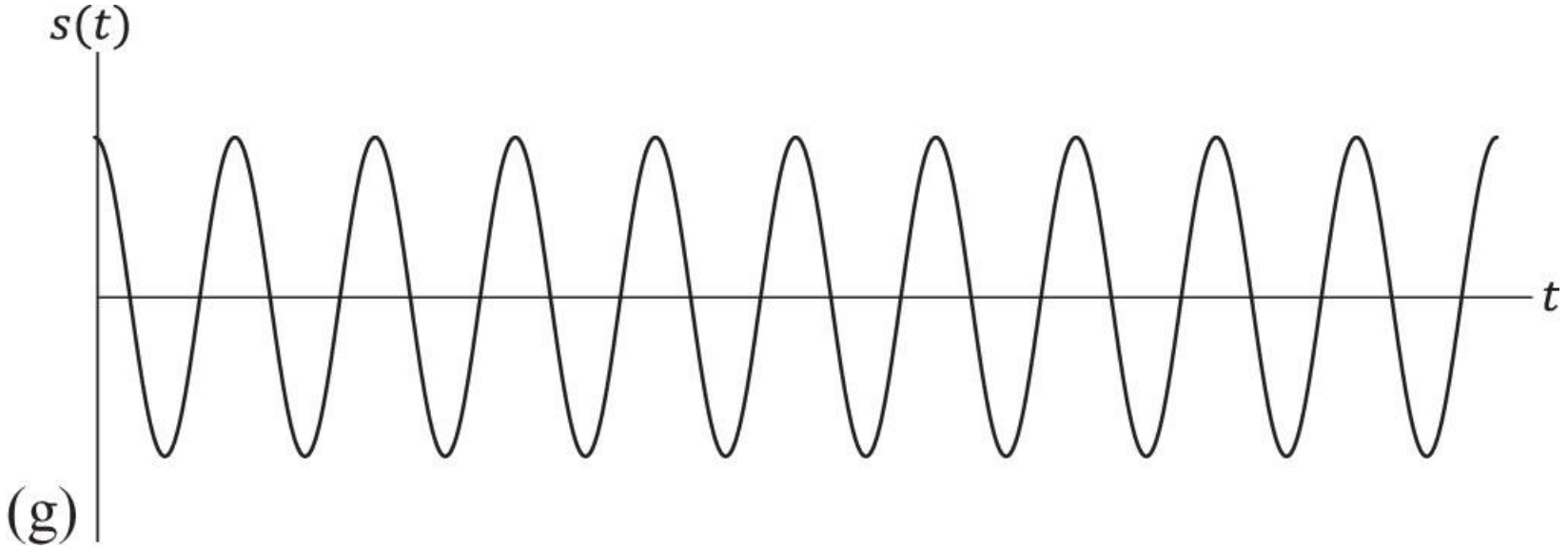

Figure A.15g Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

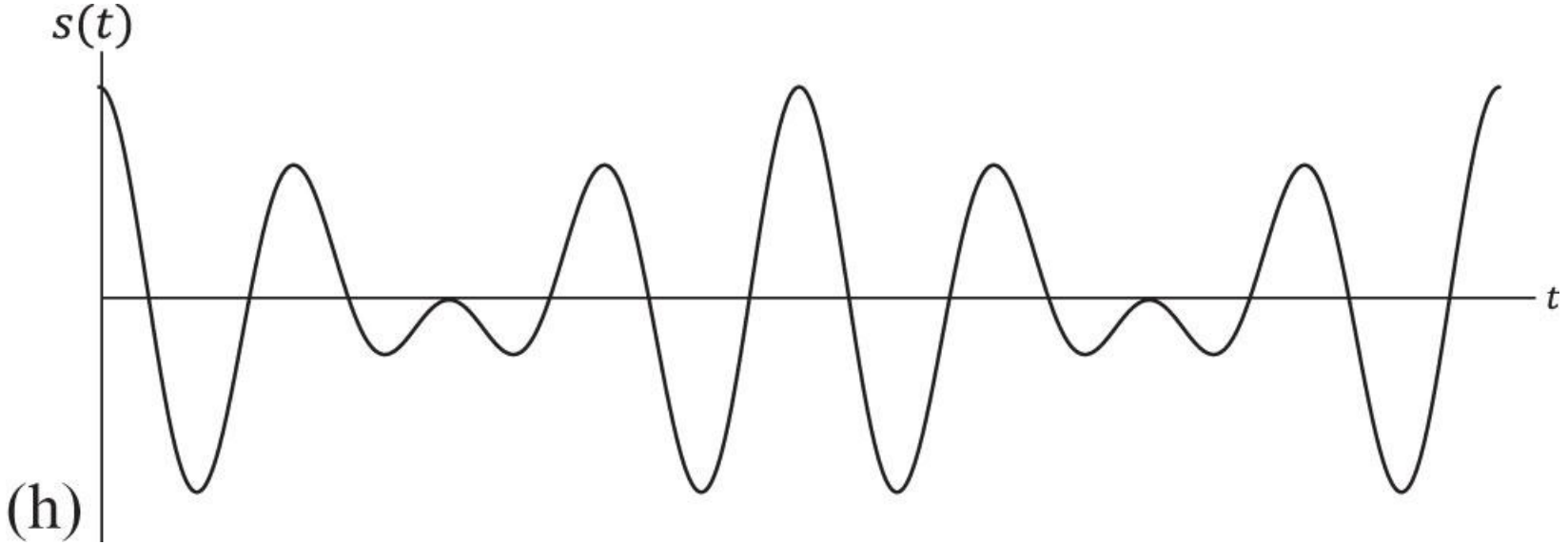

Figure A.15h Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

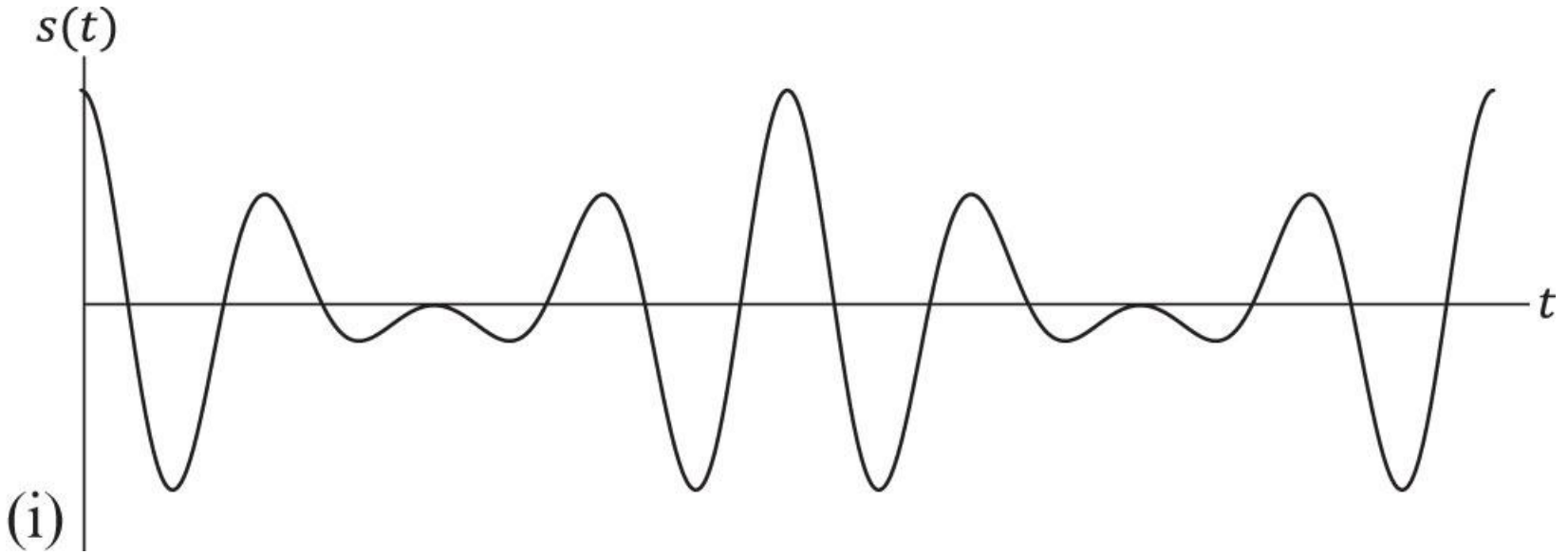

Figure A.15i Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

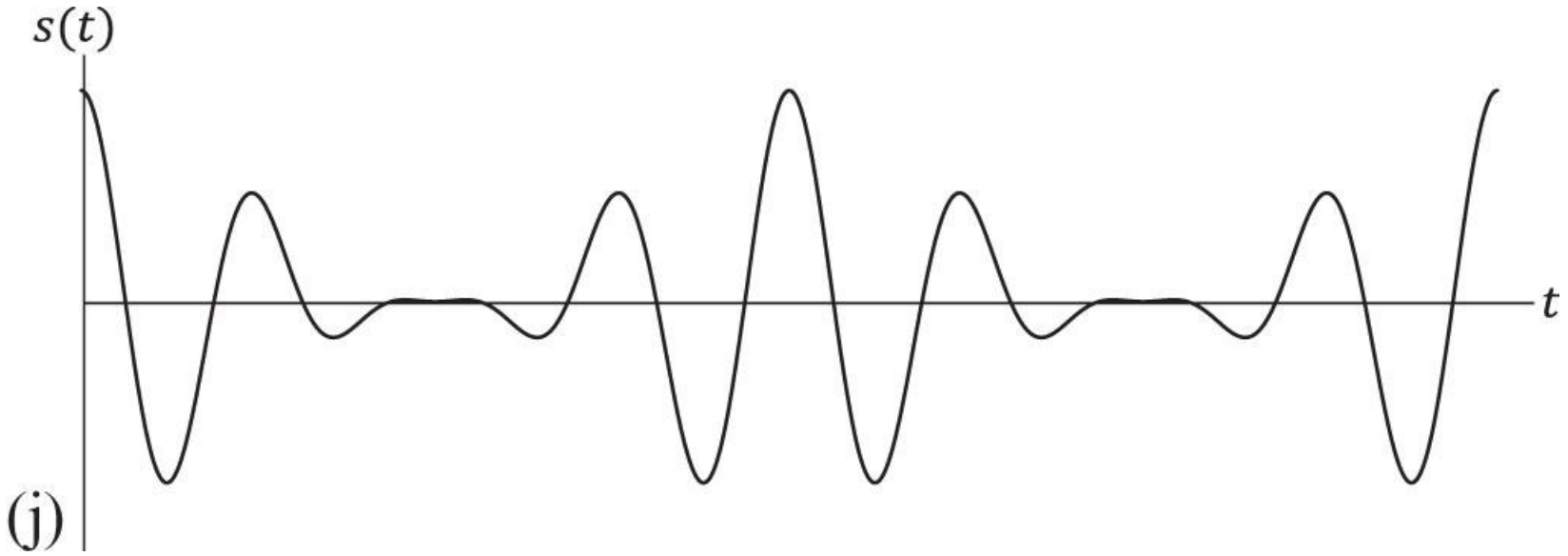

Figure A.15j Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

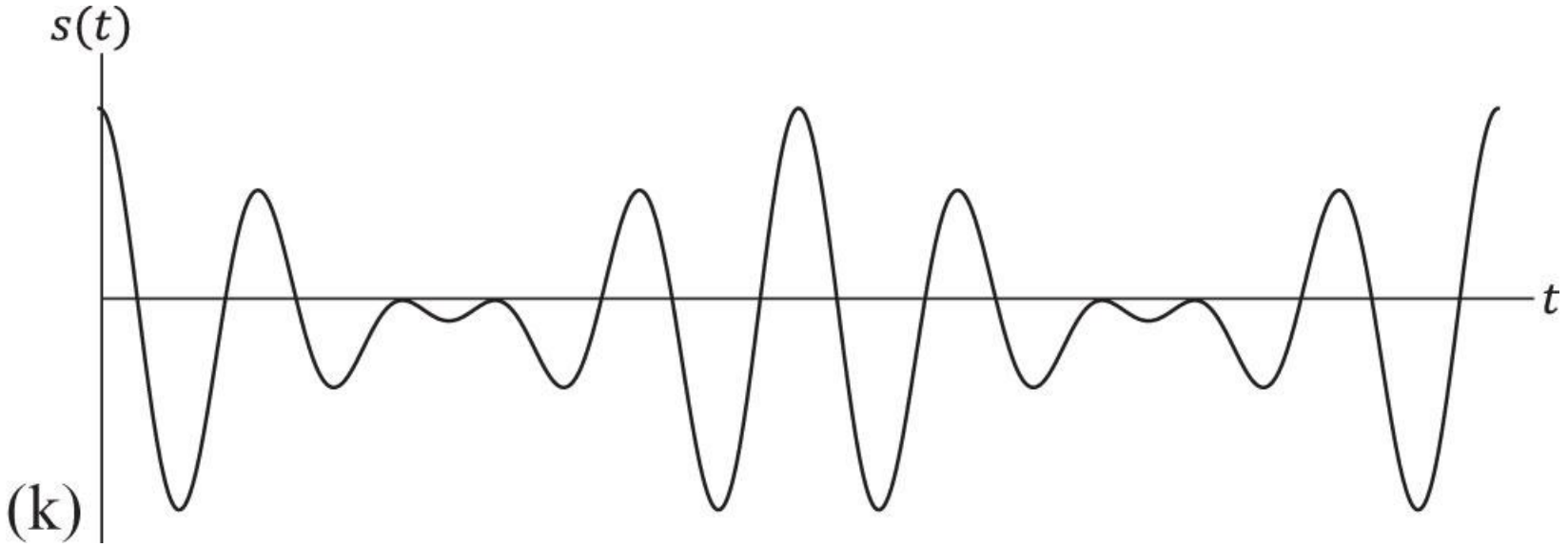

Figure A.15k Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

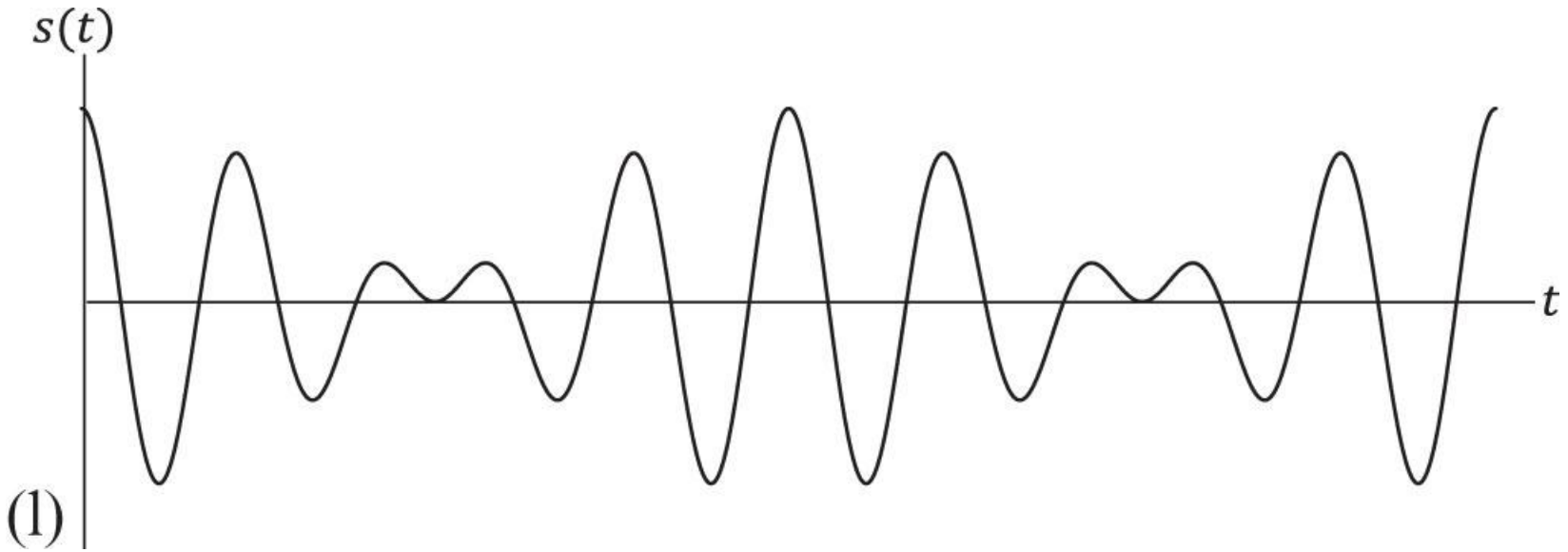

Figure A.15l Signals in the time domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSB-PC (USB).

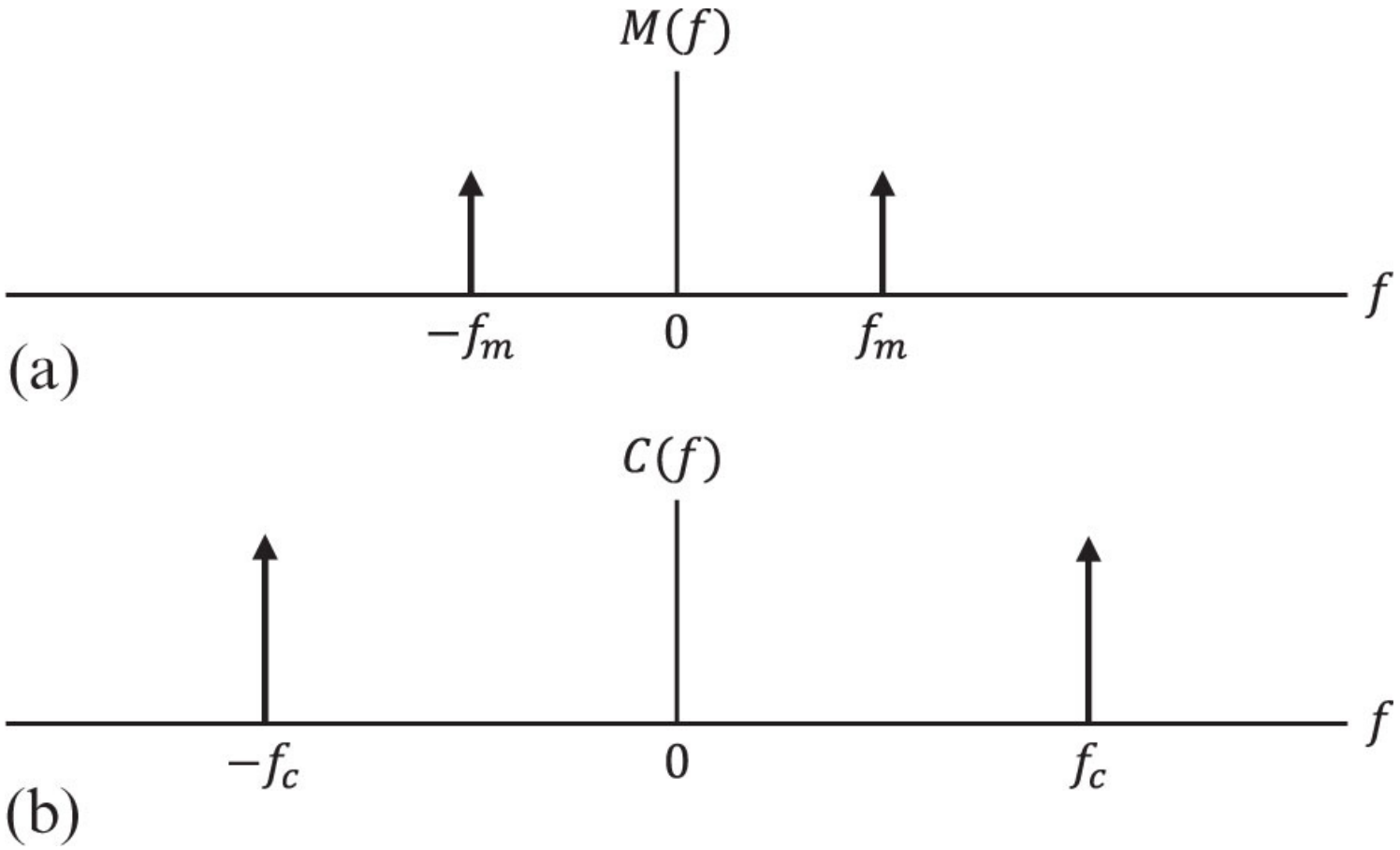

Figure A.16ab Signals in the frequency domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSBPC (USB).

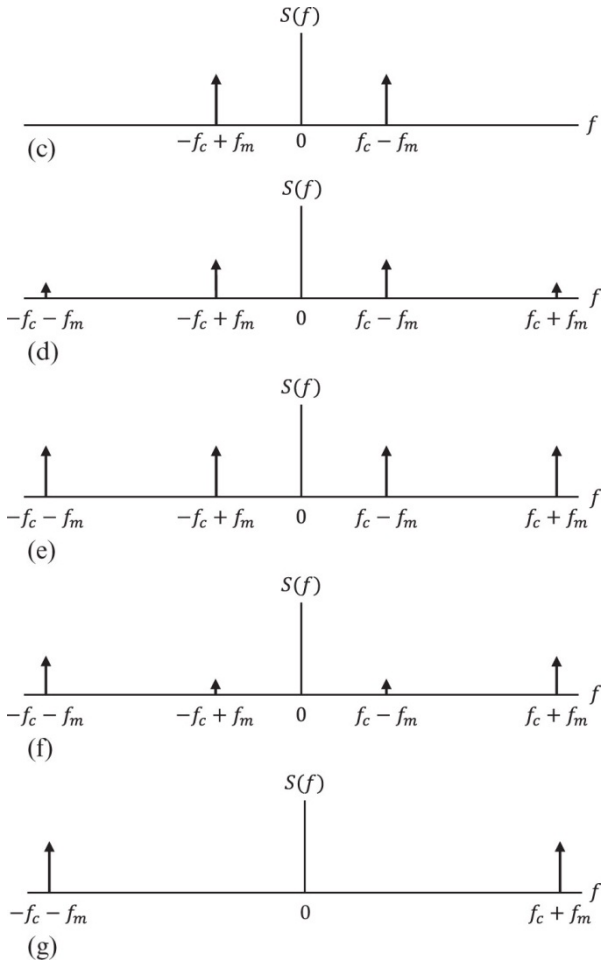

Figure A.1a-g Signals in the frequency domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSBPC (USB).

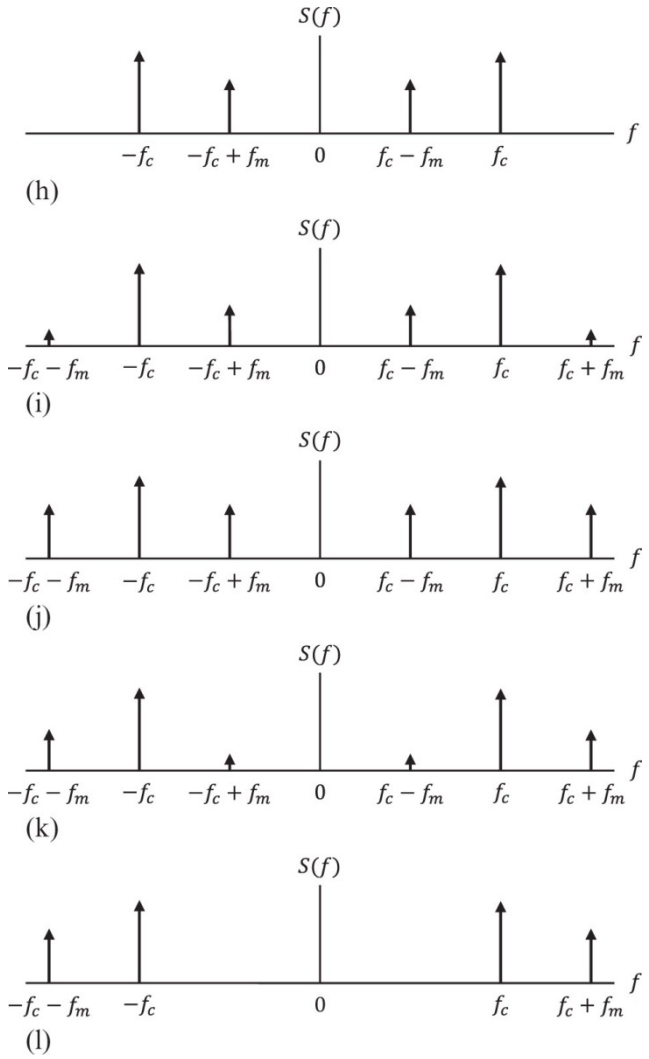

Figure A.1h-l Signals in the frequency domain: (a) modulating signal, (b) carrier wave, (c) SSB-SC (LSB), (d) VSB-SC (LSB), (e) DSB-SC, (f) VSB-SC (USB), (g) SSB-SC (USB), (h) SSB-PC (LSB), (i) VSB-PC (LSB), (j) DSB-PC, (k) VSB-PC (USB), and (l) SSBPC (USB).

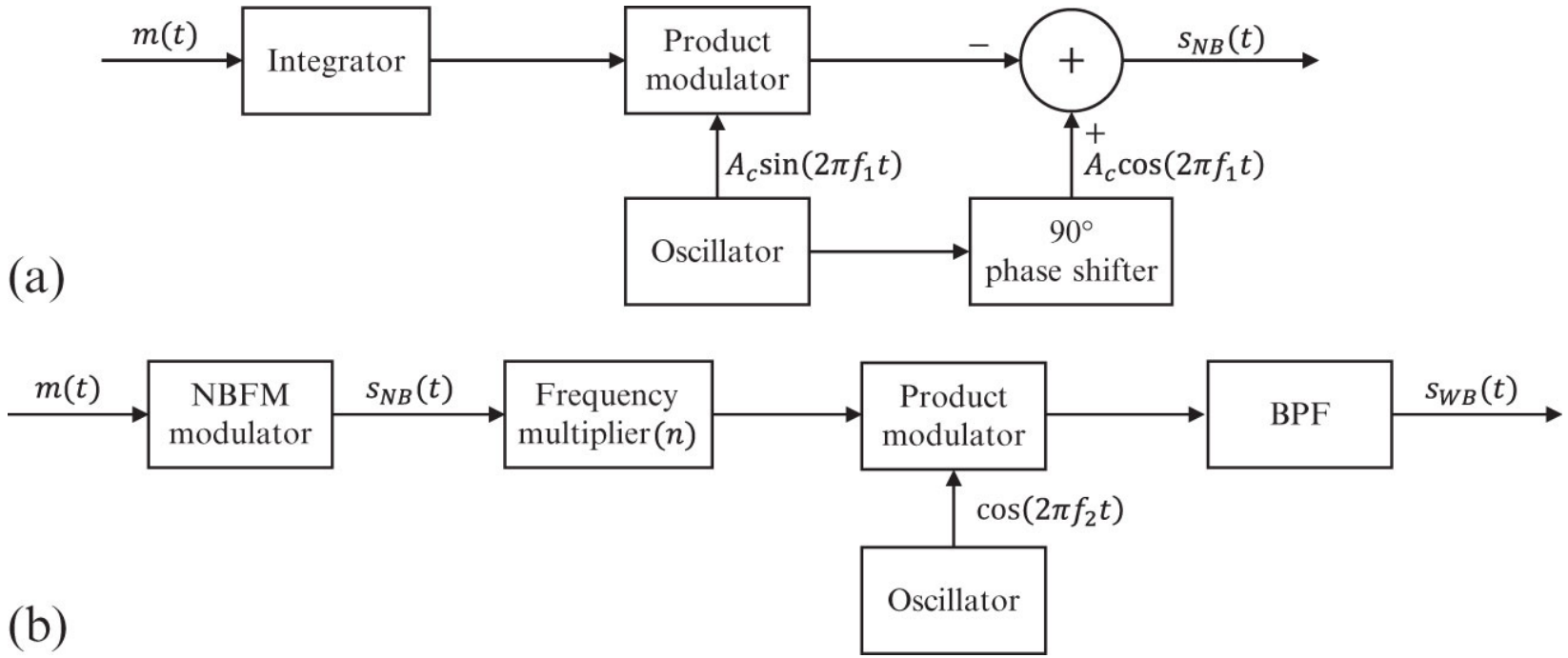

Figure A.17 FM modulator: (a) NB FM and (b) WB FM

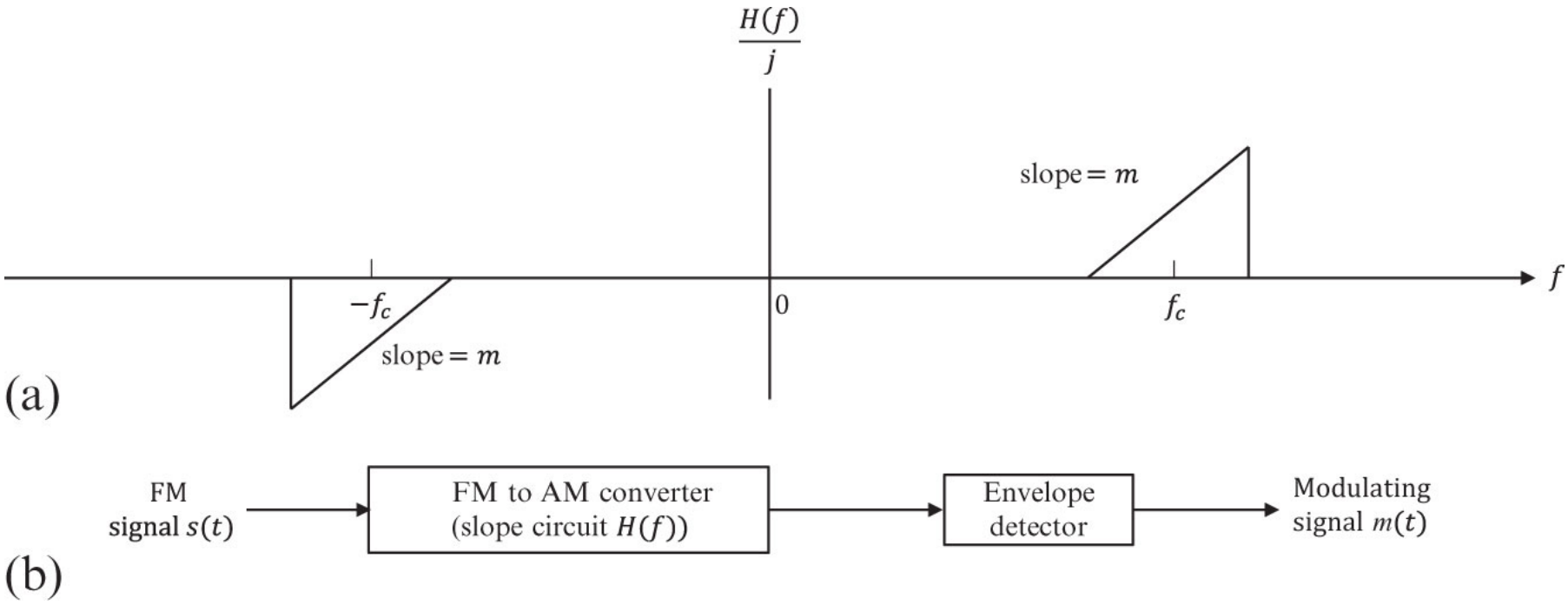

Figure A.18 FM demodulation: (a) frequency response of ideal slope circuit and (b) frequency discriminator.

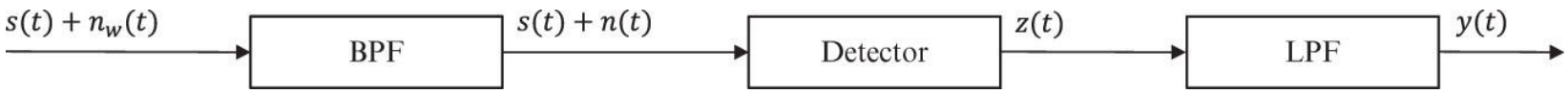

Figure A.19 Model of a noisy receiver.

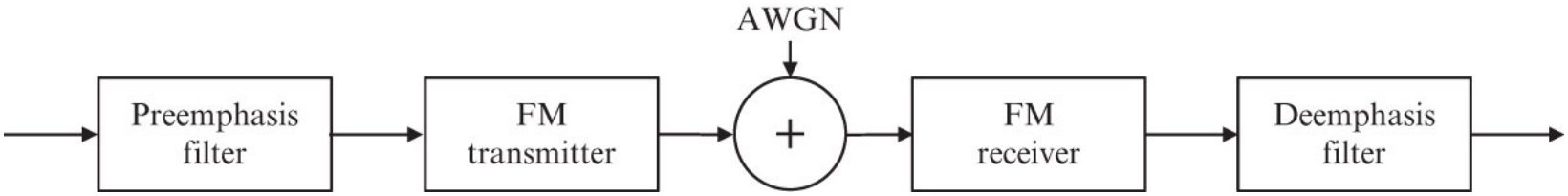

Figure A.20 Pre-emphasis and de-emphasis in an FM system.

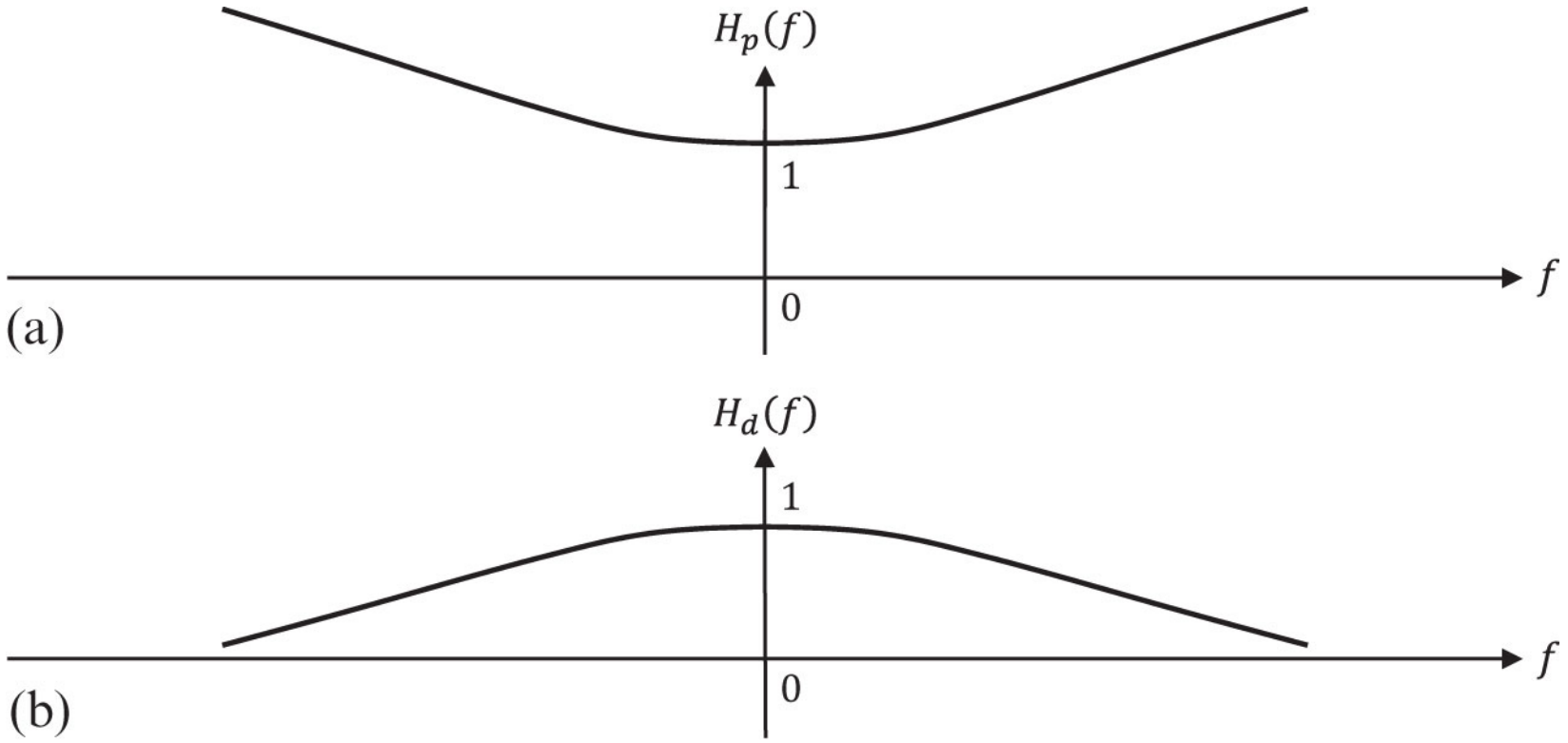

Figure A.21 Pre-emphasis and de-emphasis filters characteristics.

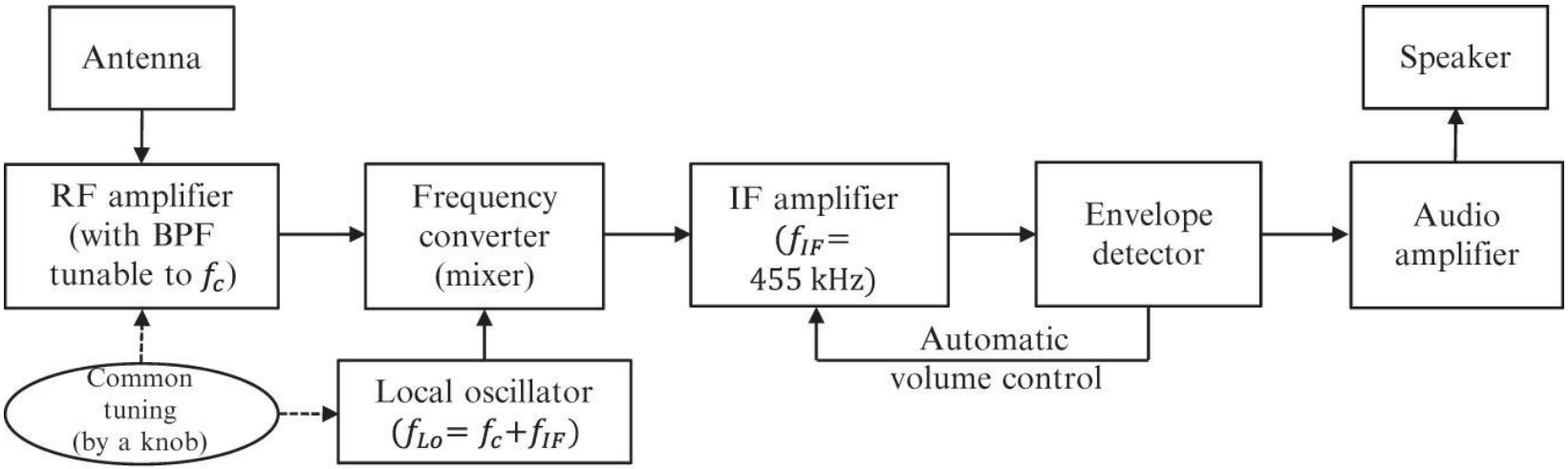

Figure A.22 Block diagram of an AM superheterodyne receiver.

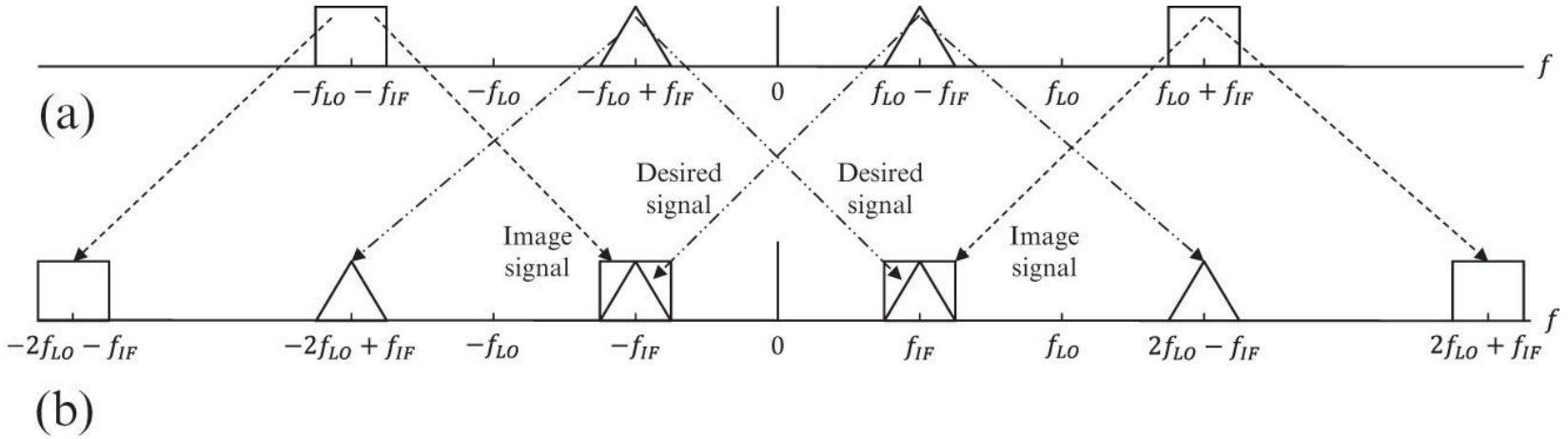

Figure A.23 AM radio broadcasting: image and desired signals (a) before mixing and (b) after mixing.

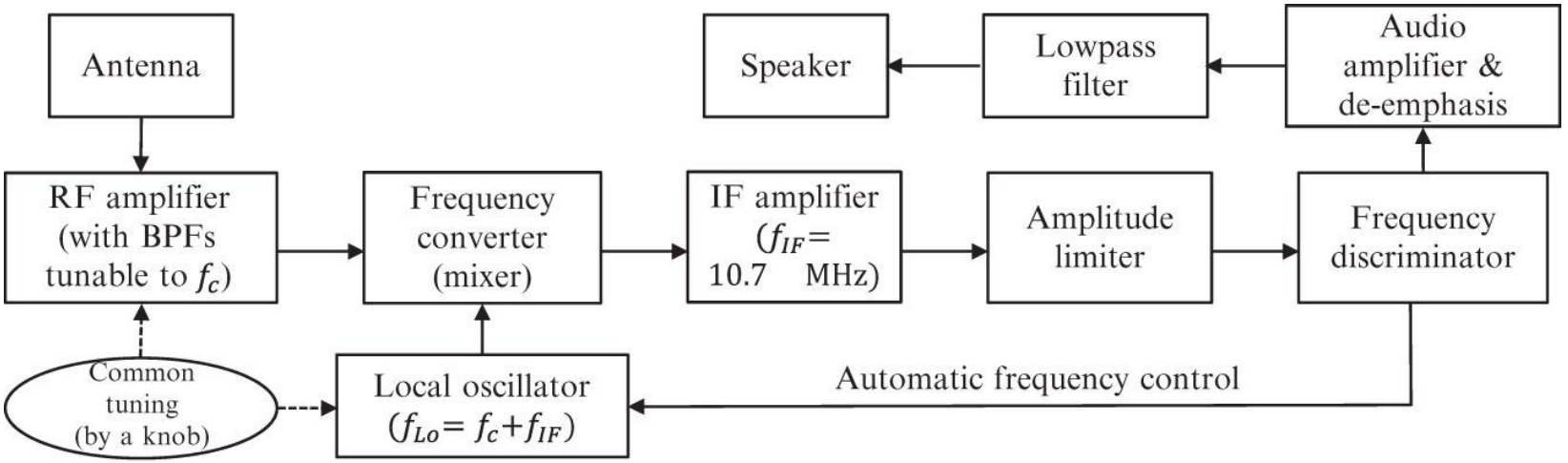

Figure A.24 Block diagram of an FM superheterodyne receiver.

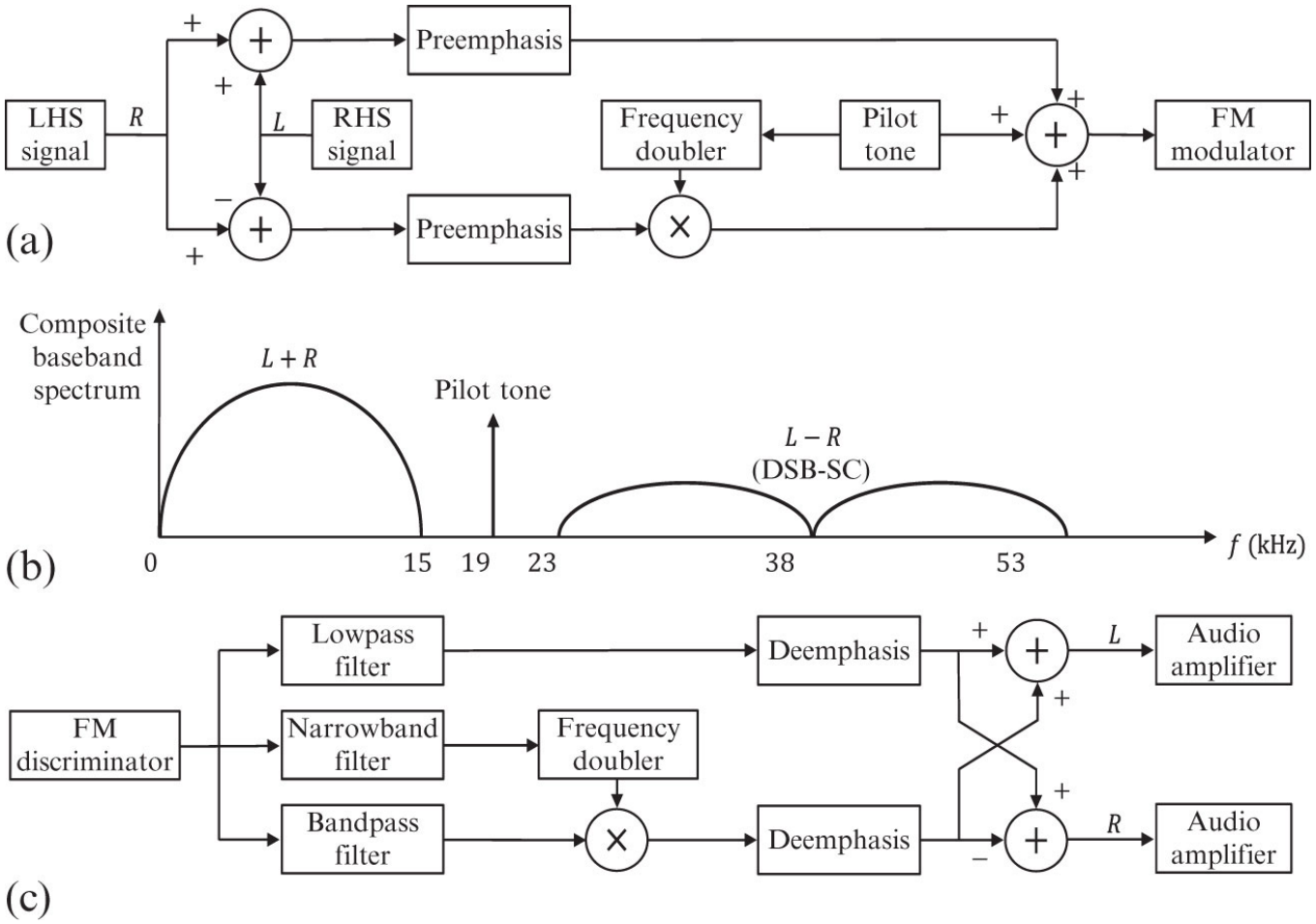

Figure A.25 FM stereo broadcasting: (a) FM stereo transmitter, (b) spectrum of FM stereo signal, and (c) FM stereo receiver.