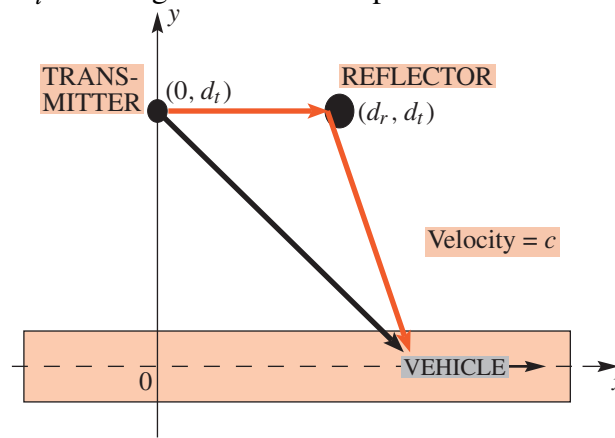


SP First ERRATA. These are mostly typos, but there are a few crucial mistakes in formulas. Underline is not used in the book, so I've used it to denote changes. JHMcClellan, April 23, 2009

- page 10*, Figure 2-4, last line of text in figure: $\implies \underline{x} = r \cos(\theta)$
- page 13*, righthand column, last line of text, change 3 to 2, ... negative slope of $-\frac{2}{3}$ for $\frac{1}{2} < t \leq \underline{2}$. Now ...
- page 34*, Figure 2-21, The diagram of the original figure does not correspond to the equations given in the problem. The general formula for the distance off the reflector, d_2 , is $d_2 = d_r + \sqrt{(x - d_r)^2 + d_t^2}$. The figure should be replaced with the one below:



- page 41, (bottom left), The CDROM citation should read:
LAB: #3 AM and FM Sinusoidal Signals
- page 44*, 2nd line, left hand column, change the sentence to read:
Since $T_0 = 1/f_0$ is the smallest possible period, it is also the fundamental period.
- page 49, equation (3.25) **Orthogonality Property**
- page 53, (2nd line of equations for a_k), denominator should be: $-j(2\pi/T_0)k$, so we would have

$$= \left(\frac{1}{T_0} \right) \frac{e^{-j(2\pi/T_0)k(\frac{1}{2}T_0)} - e^{-j(2\pi/T_0)k(0)}}{-j(2\pi/T_0)k}$$

- page 56, 2nd line of equation(3.37), exponent in exponential needs changing, should be: $e^{-j(2\pi/T_0)kt}$. The entire line should read:

$$+ \frac{1}{T_0} \int_{\frac{1}{2}T_0}^{T_0} (2(T_0 - t)/T_0) e^{-j(2\pi/T_0)kt} dt$$

- page 63, righthand column, line 18, (insert a space) ...signals, such as a Touch-Tone phone.

10. page 78, righthand column, 7 lines below equation (4.12) should read:
...arbitrary, but the ideal **D-to-C** converter always selects...
11. page 83, The CDROM citation should read:
LAB: #3 *Chirp Synthesis from Chapter 3*
12. page 91, The CDROM citation should read:
DEMO: *Reconstruction Movies*
13. page 111, The CDROM citation should read: **LAB: #6** *Digital Images: A/D and D/A*
14. page 123*, The convolution table has a notation problem. $h_1[n]$ and $h_2[n]$ are swapped and we should have written $h_2[k]h_1[n-k]$. Also, in the equation above the table, we should write: $y[n] = h_2[n] * h_1[n]$.

n	$n < 0$	0	1	2	3	4	5	6	$n > 6$
$h_1[n]$	0	1	1	1	1	0	0	0	0
$h_2[n]$	0	0	1	1	1				
$h_2[0]h_1[n]$	0	0	0	0	0	0	0	0	0
$h_2[1]h_1[n-1]$	0	0	1	1	1	0	0	0	0
$h_2[2]h_1[n-2]$	0	0	0	1	1	1	0	0	0
$h_2[3]h_1[n-3]$	0	0	0	0	1	1	1	1	0
$h[n]$	0	0	1	2	3	3	2	1	0

15. page 126, The CDROM citation should read:
LAB: #7 *Sampling, Convolution, and FIR Filtering*
16. page 132, 3rd line of Example 6-2, Missing $-\pi/3$ which should be colored.
... and $\angle H(e^{j\pi/3}) = -\pi/3$.
17. page 133, righthand column, 2nd line, algebraic steps in (6.6) **show** that $y[n]$ can finally be expressed as **a** cosine signal.
18. page 153, righthand column, middle, $dsty$ in the middle of the equation should be deleted.

$$\begin{aligned}
 & H(e^{j2\pi(250)/1000}) \\
 &= \frac{\sin(\pi(250)(11)/1000)}{\sin(\pi(250)/1000)} e^{-j2\pi(250)(5)/1000} \\
 &= 0.0909e^{-j\pi/2}
 \end{aligned}$$

19. page 156, (bottom right), The CDROM citation should read:
LAB: #9 *Encoding and Decoding Touch-Tones*
20. page 174, Exercise 7.6, equation for $w[n]$ should have minus sign instead of plus:
 $w[n] = x[n] - x[n-1]$

21. page 176, The CDROM citation should read:
DEMO: *Three Domains - FIR*
22. page 181, first paragraph of Section 7-7 should read:
 Now we can exploit our new knowledge to design filters with desirable characteristics. In this section, we will look at a special class of bandpass filters (BPFs) that are all close relatives of the running-sum filter.
23. page 192, Figure P-7.6(b), output (above the arrow on the far right) should be $w[n]$, not $y[n]$.
24. page 219*, Example 8-11 (caption), **Example 8-11: Long Division**
25. page 241*, in Problems **P-8.13** and **P-8.14**, S_6 is wrong. The upper limit on the summation needs to be 3, not 2; otherwise, no match is possible.
- $$S_6: y[n] = \sum_{k=0}^3 x[n-k]$$
26. page 242, Problem **P-8.17**, ...five possible impulse responses (J-N).
27. page 250*, Figure 9-5 (caption), Scaled unit-impulse signal is symbolized...
28. page 264, Figure 9-13(a), Label on y-axis contains a “gamma,” should be: $x(\tau)$
29. page 264, Figure 9-13(b), Label on y-axis appears to have a light gray vertical bar after the equals sign. This is only visible in the PDF file. Should be: $g(\tau) \underline{=} x(-\tau)$
30. page 295, The CDROM citation should read:
LAB: #13 *Numerical Evaluation of Fourier Series*
31. page 296, line 1 beneath Fig. 10-6 should read:
 which we can rewrite as $y(t) = \dots$
32. page 302, The CDROM citation should read:
LAB: #15 *Fourier Series* (Ch. 12)
33. page 312*, The following derivation should be written on two lines instead of three; otherwise, the equals sign is ambiguous.

$$|X(j\omega)| = \left| \int_{-\infty}^{\infty} x(t)e^{-j\omega t} dt \right|$$

$$\leq \int_{-\infty}^{\infty} |x(t)e^{-j\omega t}| dt = \int_{-\infty}^{\infty} |x(t)| dt$$

34. page 319*, line 8, righthand column, (insert comma)
 necessary condition, for having a Fourier transform.

35. page 326, line 11, righthand column,
...we showed in (10.3)...

36. page 329*, equation in righthand column is missing T^2 ,

$$y(t) = x(t) * h(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} \underline{T^2} \left(\frac{\sin(\omega T/2)}{(\omega T/2)} \right)^2 e^{j\omega t} d\omega$$

or T could be removed from the denominator and it could be written as:

$$y(t) = x(t) * h(t) = \frac{1}{2\pi} \int_{-\infty}^{\infty} \left(\frac{\sin(\omega T/2)}{\underline{(\omega/2)}} \right)^2 e^{j\omega t} d\omega$$

37. page 349*, Figure P-12.4(b), input signal to first block should be $x(t)$, instead of $x[n]$

38. page 351, line 1, righthand column,
remove the words “filtersFrequency selective” so that it reads:
... *frequency selective* filters. In this section,...

39. page 354*, Figure 12-9, 2nd line of caption, (subscript not italic)
...to give the output signal $y_{lp}(t)$.

40. page 355, The CDROM citation should read:
LAB: #14 *Design with Fourier Series*

41. page 364, Figure 12-20, misspelled word inside the first block: Half-Wave Rectifier

42. page 368*, equation (12.40), second line is missing n ; it should be:

$$= x(t) \sum_{n=-\infty}^{\infty} \delta(t - \underline{n}T_s)$$

43. page 369*, Example **12-5**, first equation is missing a k inside the δ function:

$$P(j\omega) = \sum_{k=-\infty}^{\infty} \left(\frac{2\pi}{T_s} \right) \delta(\omega - \underline{k}\omega_s)$$

44. page 379, Figure 12-35(d), the rightmost label $2\pi\gamma$ contains an extraneous γ ; should be 2π

45. page 381*, Problem **P-12.2** has ω_{c01} and ω_{c02} switched, because the natural assumption is that ω_{c01} is the lower passband cutoff frequency, while ω_{c02} is the upper one. Thus, the natural assumption is that $\omega_{c01} < \omega_{c02}$. To correct this equation (12.76) should be changed to:

$$h_{bp}(t) = \frac{\sin(\underline{\omega_{c02}}t)}{\pi t} - \frac{\sin(\underline{\omega_{c01}}t)}{\pi t}$$

46. page 383*, Problem **P-12.7** part (c), change minus sign to plus sign:

$$w(t) = \frac{1}{2}x_1(t)[1 \pm \cos(2\omega_c t)]...$$

47. page 383, Figure P-12.8, inside block (bad spacing)
LTI System

48. page 384, Figure P-12.9, inside block (bad spacing)
LTI System

49. page 385, Figure P-12.11(a), change summation index to k in the definition of $p(t)$:

$$p(t) = \sum_{k=-\infty}^{\infty} a_k e^{jk\omega_p t}$$

50. page 386, Problem **P-12.13**, change π to π/T_s in the definition of $H_r(j\omega)$:

$$H_r(j\omega) = \begin{cases} T_s & |\omega| \leq \pi/T_s \\ 0 & |\omega| > \pi/T_s \end{cases}$$

51. page 387, Figure P-12.15(b), change 4 to 1 in the definition of the passband of $H(e^{j\hat{\omega}})$.

52. page 392, before equation (13.8), lefthand column, (insert space)
.....equation (12.61) on p. 376, that the DTFT of...

53. page 410, top, lefthand column, section title should be:
13-8.2 Spectrograms in MATLAB

54. page 413*, Figure 13-20, Label on x -axis should be (sec) not (msec):
Time (sec)

55. page 414*, Figure 13-22, Label on x -axis should be (sec) not (msec):
Time (sec)

56. page 414*, Figure 13-23, Label on x -axis should be (sec) not (msec):
Time (sec)

57. page 438*, Figure A-13 (caption),
For the vectors shown, $|z_1| > 1$ and $|z_3| < 1$.

58. page 460, top line, lefthand column,
Use the built-in MATLAB editor, or an external one...

Optional:

1. page 26, The suggested change in wording was not made:
Change **LAB: #2, Adding Sinusoids and Complex Amplitudes**
to **LAB: #2 Introduction to Complex Exponentials**.
Note: this change was made correctly on page 31.

2. page 46, The CDROM citation should read:
DEMO: *Spectrograms: Simple Sounds: Square Wave*
3. page 68, Problem **P-3.15** (b), top of the right hand column.
 It would make a better problem to define $y(t)$ as $2x(t - T_0/4)$ because then the shifted square wave has its jumps at $t = 0$ and $t = T_0/2$ like the example worked out in Section 3-6.1.
4. page 416, The CDROM citation should read:
DEMO: Ch 3, *Spectrograms*
5. page 381, in Problems **P-12.2** and **P-12.3** it should be stated that $\omega_{c01} < \omega_{c02}$.

CD-ROM Errata:

1. Exercise 3.8 solution is wrong because the $k = 3$ term was evaluated incorrectly. The last two lines should be:

$$\begin{aligned}
 x_N(t) &= \frac{1}{2} - \frac{2}{\pi} e^{j50\pi t} - \frac{2}{\pi} e^{-j50\pi t} - \frac{2}{3^2\pi} e^{j150\pi t} - \frac{2}{3^2\pi} e^{-j150\pi t} \\
 &= \frac{1}{2} - \frac{4}{\pi} \cos(50\pi t) - \frac{4}{9\pi} \cos(150\pi t)
 \end{aligned}$$

2. Exercise 7.6 solution was not consistent with the printed version (1st and 2nd printing) of the text. However, the error is with the text, so the solution is not changed.