

Known Corrections Needed to the First Printing of
The 3-D Global Spatial Data Model - Book #63014

(Latest Correction Date – April 14, 2017)

Compiled by author, Earl F. Burkholder – June 27, 2008 (& subsequent dates)

1. Page 71:

The digits (numbers) in the matrix of equation (3.47) should not be italicized.

2. Page 71:

The digits “300,034.86” in equation (3.48) should not be italicized. **(See also items 14 and 18 later on.)**

3. Page 82:

7 lines from the bottom – the variable “*SPR*” should be italicized – both places. (as in the preceding line)

4. Page 88:

Equation (4.15) should read: $d_1 = \Delta e \sin \alpha + \Delta n \cos \alpha \pm \sqrt{d_2^2 - (\Delta e \cos \alpha - \Delta n \sin \alpha)^2}$

5. Page 91:

Equation (4.23) – The variable “*R*” appears twice. Both should be italicized. (currently, one is and one isn't)

6. Page 92:

Equations (4.24), (4.24a), and (4.25) – None of the digits in these equations should be italicized.

7. Page 167:

Figure 6.15 – Author's preference is that the border be removed in the interest of consistency with Figure 6.18 on Page 178.

8. Page 193:

The formal name “Mean Sea Level Datum of 1929” is incorrect. The word “mean” should not be part of the formal name and should be removed:

- a. From the heading near top of page 193.

- b. From line 1 of the paragraph following the heading.
- c. From line 12 of the paragraph following the heading.

9. Page 218 (and others as noted)

It is the policy of the National Geodetic Survey that the name of the program GEOID03 be capitalized. The name GEOID03 is not capitalized in the text and should be changed on the following pages:

Page 218 – lines 22, line 33, and 36 (depending on how lines are counted)

Page 219 – line 3 and line 19

Page 220 – line 37 (twice in the same line – it must be capitalized in URL)

10. Page 268 (and 283 and 284)

The base of natural logarithms is explained just below the middle of page 268. I am satisfied with how it is shown here. Subsequent references should be consistent.

- See page 283 just following equation (10.140) and page 284 just following equation (10.144) – in each case, the words “base of” should be deleted.
- The wording in equation (10.157) appears to be correct. However, for consistency, equation (10.157) should be changed to:

$$\chi = 2 \tan^{-1} \left(\frac{\exp(Q) - 1}{\exp(Q) + 1} \right)$$

11. Page 303:

Equations (11.2) and (11.3) are both complete and the information is all there. But, the formatting should be improved. An example is to follow the formatting used for equations (1.29) and (1.30) on page 15. The two pairs of matrix equations should be shown as identical and the format used on page 15 is preferred. Note, in one case, the variables in the matrices are listed before the equations and in the other case the variable listing follows the matrices. That arrangement is acceptable to the author – no change is needed for the variable listings.

12. Page 342:

The left margin got cut off at the top and some weird things happened to the paragraph prior to “Correlation of Forepoint wrt Standpoint”. Appendix C is pages 1 and 2 of a spreadsheet that can be downloaded by following an appropriate link at <http://www.globalcogo.com/WBK3D.html>.

Additional Corrections to be made to the First Printing of
The 3-D Global Spatial Data Model
Book #63014

Compiled by author, Earl F. Burkholder – October 31, 2008

13. Page 50: Figure 3.5 – The definitions for secant and cosecant got reversed. The correct listing is:

$$\begin{array}{llll} \text{secant } \theta & \sec \theta & = & \mathbf{hyp/adj} \\ \text{cosecant } \theta & \csc \theta & = & \mathbf{hyp/opp} \end{array}$$

14. Page 68: The partial derivative values in equation (3.28) are reversed. This reversal drives various computational corrections in following pages.

$$\mathbf{J}_{YX} = \left[\frac{\partial V}{\partial R} \quad \frac{\partial V}{h} \right] = [3,141.59 \quad 7,853.98] \quad (3.28)$$

15. Page 69 – top of page:

$$\Sigma_{YY} = [3,141.59 \quad 7,853.98] \begin{bmatrix} 0.0049 & 0.0000 \\ 0.0000 & 0.0004 \end{bmatrix} \begin{bmatrix} 3,141.59 \\ 7,853.98 \end{bmatrix}$$

$$\Sigma_{YY} = \text{Variance of volume} = 73,034.98 \text{ m}^6 \quad (3.28)$$

16. Page 69 – Paragraph 6A:

- a. The number “553.36” should be “270.25”
- b. The number “550” should be “270”
- c. The number “1,106.7” should be “540.5”
- d. The number “1,100” should be “540”

17. Page 69 – Paragraph 6B:

- a. The number “550” should be “270”
- b. The number “1,100” should be “540”

18. Page 71 – Bottom of page:

$$\Sigma_{YY} = [3,141.59 \quad 7,853.98] \begin{bmatrix} 0.004992319 & -0.000247027 \\ -0.000247027 & 0.0004330231 \end{bmatrix} \begin{bmatrix} 3,141.59 \\ 7,853.98 \end{bmatrix}$$

$$\Sigma_{YY} = \text{Variance of volume} = 63,792.91 \text{ m}^6 \quad (3.48)$$

19. Page 71 – last line:

The correlated standard deviation of the computed volume is 252.57 m^3 .

20. Page 72 – First paragraph, sentences 2 and 3 should be re-written as:

The example shows that, although the standard deviations of correlated measurements is smaller, the uncorrelated and the correlated standard deviations are very nearly the same. The volume of the tank is reported as $78,500 \text{ m}^3 \pm 250 \text{ m}^3$.

More Corrections to be made to the First Printing of
The 3-D Global Spatial Data Model – CRC Press Book #63014
November 8, 2008

21. Page 186 – line 4:

The word “latitude” is wrong. It should be “ λ = geodetic longitude of . . .”

22. Page 188 – lines 3 and 4:

In each case, it should read “WGS84” not “WSG84.”

23. Page 201 – 3 lines before “Definitions”:

The correct name is “Sea Level Datum of 1929,” remove “Mean.”

24. Page 209 – 3 lines before “Differential Levels”:

The correct name is “Sea Level Datum of 1929,” remove “Mean.”

25. Page 206 – Equation (8.5) should be:

$$\alpha = A - \eta \tan \phi \quad \text{azimuth} \quad (8.5)$$

26. Page 136 – last item in Table 6.1:

It should read “ $c = 6,399,593.6258 \text{ m}$ ” not “ $c = 3,399,593.6258 \text{ m}$.”

27. Page 345 – index entry:

It should be “arc-to-chord correction” instead of “arc-to-cord correction.”

28. Page 128 – off by 100 years (found by author - August 2009)

The Lapland expedition returned in **1737** not 1637 as stated in book.

More Corrections to be made to the First Printing of
The 3-D Global Spatial Data Model – CRC Press Book #63014
May 12, 2010

29. Page 69 – Equation (3.30)

Two subscripts should be used instead of one. The equation should be:

$$R = 0.5 (SD_3 \sin Z_3 - SD_2 \sin Z_2)$$

30. Page 95 – the numbers for the station equation in Figure 4.8 do not match the values listed in the text. The text should be revised as follows:

For example, a station equation (175+96.92 BK = 176+00 AH) is used at the end of the curve shown in Figure 4.8. What is the centerline distance between station 170+00 on the curve and station 180+00 on the tangent?

$$\begin{aligned} \text{Distance along curved portion} &= 175+96.62 - 170+00 = 596.92 \text{ feet} \\ \text{Distance along tangent portion} &= 180+00 - 176+00 = 400.00 \text{ feet} \\ \text{Total distance} &= 996.92 \text{ feet} \end{aligned}$$

August 26, 2010

31. Page 271 – There is a typo in equation (10.50), R_b should be R_ϕ .
32. Page 342 – The value in cell K49 should be 0.957586857 (-sin(longitude)) not (-sin(latitude)). The problem, although it does not affect the answer, has been corrected in the excel spreadsheet program posted on the Global COGO web site (http://www.zianet.com/globalcogo/Appendix_C3.xls)

The following corrections were discovered by Dr. William L. Stein, Senior Imagery Scientist at New Mexico State University Physical Science Laboratory upon using the book, “The 3-D Global Spatial Data Model,” in teaching SUR 361, the Introduction to Geodesy course, fall semester 2010 in the undergraduate Surveying Engineering curriculum at NMSU.

Corrections to
The 3-D Global Spatial Data Model

33. Page 125:
Paragraph on Poseidonius: Change dates from (135-150 b.c.) to (135-51 b.c.).
In the same paragraph, change “constellation” to “star” in second to last sentence.

34. Page 138:
 In equation 6.12, change “ $\cos^2\varphi$ ” to “ $\cos^2\phi$ ”
 In equation 6.13, change “ x^2 ” to “ X^2 ”
35. Page 141:
 In TABLE 6.2, in the equation for “N”, change “ $\sin^2\varphi^{3/2}$ ” to “ $\sin^2\phi$ ”
36. Page 154-155:
 Change the denominators in equations 6.60, 6.61 and 6.62 from
 “ $(1-e^2\sin^2\varphi)$ ” to “ $(1-e^2\sin^2\phi)^2$ ” (See Rapp, 1991, page 42)
37. Page 158:
 In the equation above 6.68, change “ $\cos\alpha_{\max}$ ” to “ $\cos\phi_{\max}$ ”
38. Page 166:
 In step 10, change “Compute M_m and N_n at the element midpoint.”
 to “Compute M and N at the element **endpoint**.”
39. Page 330:
 In the first equation for FIGURE A.2, change “ $X' = X\cos\theta + Z\sin\theta$ ” to
 “ $X' = X\cos\theta - Z\sin\theta$ ”

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 Scientist at New Mexico State University Physical Science Laboratory upon using the
 book, “The 3-D Global Spatial Data Model,” in teaching SUR 361, the Introduction to
 Geodesy course, fall semester 2011 in the undergraduate Surveying Engineering
 curriculum at NMSU.

Corrections to
The 3-D Global Spatial Data Model

40. Page 136 – Table 6.1:
 The value for e^2 for the Clarke Spheroid of 1866 should be 0.00676865799729
 not 0.006865799729

41. Page 332 Matrix A.4 – column 1, row 2:
 The value should be “ $-\sin\phi\cos\lambda$ ” not “ $-\sin\phi\cos\varphi$ ”

 The following correction was pointed out by Dr. Ahmed Elaksher, Surveying Professor at
 New Mexico State University.

42. Page 164 – equation (6.84)

The end of equation (6.84) should be $\arctan(x/y)$, not $\arctan(y/x)$.

In reviewing material for the 2nd Edition, Mr. Glen Schaefer, retired geodetic engineer from the Wisconsin DOT, noted:

43. Appendix B: The header column for latitude/longitude should be reversed to match the sequence of values listed in the columns. The switch is applicable to all zones listed in Appendix B.

April 21, 2016

44. Appendix A, Equations A.1, A.2, and A.3 are integral with the illustrations. The remaining equations should be labeled A.4, A.5, A.6, and A.7. In the text on page 331, - the paragraph on multiplication - the references to equations A.1, A.2, A.3, and A.4 should likewise be changed.

April 14, 2017

45. Mr. Glen Schaefer (see above) noted that he prefers the title “retired geodetic engineer” – change made.

46. Previous item #45 was a duplicate of item #40. It was eliminated.