

ERRATA SHEET**Fall 2001 Version**

Basic Engineering Science — A Systems, Accounting, and Modeling Approach by D. E. Richards

Original List — 5 November 2001

Pg 3–11 Last two equations should read as follows

$$\dot{m} = \int_{A_c} r V_{rel,n} dA = r \int_{A_c} V_{rel,n} dA \quad \rightarrow \quad \dot{m} = r \dot{V}$$

$$m_{sys} = \int_{\dot{V}_{sys}} r dV = r \int_{\dot{V}_{sys}} dV \quad \rightarrow \quad m_{sys} = r \dot{V}_{sys}$$

Pg 3–41 The third line of the block quotation on reactive systems is incorrect. The word “minus” should be replaced by the word “plus” and the entire line should read “the number of independent species plus the number of “

Pg 3–43 Section 3.6.1 should be “Density and Specific Volume” not “Specific Weight”

Pg 3–51 Problem 3.6 is confusing as written. The correct problem statement is given below:
 “Air flows near a flat plate and the flat plate produces a region of retarded flow near the plate surface. In this region, known as the boundary layer, the fluid velocity $u = 0$ at the plate surface ($y = 0$) and u approaches U_o , the free-stream velocity, far away from the wall ($y \gg d$). Measurements reveal that $u/U_o = 0.99$ when $y = 23$ mm. The plate has a width (into the paper) of $w = 10$ m. Determine (a) the value of d using the given velocity profile, (b) the volumetric flow rate of air represented by the large black arrow, i.e. flow across the dashed surface, and (c) the average velocity normal to the dashed surface. “

Pg 5–26 Last sentence in item 5 should begin “If your analysis....” *not* “If you analysis”.

Pg 5–43 *Linear Impulse* should be Section 5.4.1

Pg 5–44 *Impulsive Forces* should be Section 5.4.2

Pg 6–3 Next to last bulleted item is incorrect. The point of application is *not* “at point P , the point of application of the force \mathbf{F} .” The correct point of application is “at point O , the point about which we are taking the moment.”

Pg 7–3 Equation 7.2 has several errors in it
 the velocity V , should be replaced with the differential displacement vector ds .
 the cosine is missing an argument. It should be $\cos \theta$.
 The first line of the equation should read as follows:

$$dW_{\text{mech}} = \mathbf{F} \cdot d\mathbf{s} = |\mathbf{F}| |d\mathbf{s}| \cos \theta = F \cdot ds \cdot \cos \theta$$

Pg 7–4 In last bulleted item on page, the relation between hp and ft·lbf/s is incorrect.
 Correct relation $\rightarrow 1 \text{ hp} = 550 \text{ ft}\cdot\text{lbf/s}$

Pg 7–8 No error on this page.

Pg 7–20 First line of text is missing a word “work for a closed only”. Should read “work for a closed system only”

Pg 7–31 In the next to last line of the text, replace the work “block” with the word “blocks.”

Pg 7–32 First line after definition of heat transfer, replace the word “mechanism” with the word “mechanisms”

Pg 7–35 Fourth line after Eq. (7.44) replace “ad” with “add”

- Pg 7-43 Incorrectly switched from USCS units to SI units.
Change kg/h → lbm/h and kJ/kg → Btu/lbm
- Pg 7-66 First line after Eq. (7.75) should begin “The word....” not “The work....”.
- Pg 7-91 In Example 2, incorrectly used a numerical value of 5 for COP in the computations.
Using correct COP = 4, the net power input is 2,500 Btu/h
- Pg 7-93 All problems in Section 7.10 should be numbered 7.X not 8.X.
- Pg 8-4 Reversible and Irreversible Processes should *not* be a numbered heading. Should be the same heading level as *Second Law of Thermodynamics* on Pg. 8-5
- Pg 8-7 “How can entropy be stored in a system?” should be Section 8.1.2.
- Pg 8-7 “How can entropy be transported?” should be Section 8.1.3.
- Pg 8-8 “How can entropy be generated or consumed?” should be Section 8.1.4.
- Pg 8-9 “Putting it all together....” should be Section 8.1.5
- Pg 8-30 *Power Cycles* should be Section 8.4.1
- Pg 8-35 *Refrigeration and Heat Pump Cycles* should be Section 8.4.2
- Pg 8-39 “8.4.2 Entropy and the substance Models” should be “~~8.8~~ 8.5 Entropy and the Substance Models”
- Pg 8-39 “*Relating s to T...*” should be Section 8.5.1
- Pg 8-40 “*Ds – Ideal Gas Model*” should be Section 8.5.2
- Pg 8-42 “*Ds – Incompressible Substance Model*” should be Section 8.5.3
- Pg 8-43 “*Examples*” should be Section 8.5.4
- Pg 8-49 “Problems” should be Section 8.6

Additions — 9 November 2001

- Pg 2-11 Sentence immediately preceding Eq. (2.4) should read as follows: “The integration of \dot{B} with respect to time over the same time interval is an amount of B not a change in B as shown below:”
- Pg 2-14 On first line of the page, the last five words of the first line should read -- “the system ~~is~~ *in* question was...”
- Pg 7-3 Equation 7.2 has several errors in it. The first line of the equation should read as follows:
- $$dW_{\text{mech}} = \mathbf{F} \cdot d\mathbf{s} = |\mathbf{F}| |d\mathbf{s}| \cos q = F \cdot ds \cdot \cos q$$
- Pg 7-8 No error on this page.
- Pg 7-52 Eq. (7.61) is incorrect. It should read: $dh = d(u + Pv) = du + vdP$.
- Pg 8-39 See correction above at Pg 8-39.