Engineering Noise Control 6^{th} edn.
Errata and Clarifications

September 8, 2025

p32, Equation (1.87), remove "eq" at the end of the equation.

p36, Equation (1.101), the subscripts "60,1 60,1 and 60,1" should be "60,1 60,2 and 60,3", respectively.

p.43, Line above Equation (1.113), Change "These" to "For 1/3-octave bands, these".

p.43, in order to be consistent with more commonly used base-10 filters, change Equation (1.115) to

$$\Delta f = f_{C(\mathrm{exact})} \times (10^{3/20N} - 10^{-3/20N}) = \begin{cases} 0.230768 f_{C(\mathrm{exact})}; & \text{for 1/3-octave bands} \\ 0.704592 f_{C(\mathrm{exact})}; & \text{for octave bands} \end{cases}$$

p.43, 3 lines from bottom of page, change "(707 − 353) = 354" to "(708 − 355) = 353".

p.43, Bottom line, change "354" to "353".

p127, 2 lines below Equation (2.112), change (2.114) to (2.112).

p254, LHS of Equation (5.25), change $\langle p^2 \rangle_{d_{SR}}$ to $\langle p_t^2 \rangle_{d_{SR}}$.

p257, LHS of Equation (5.49), change $\langle p^2 \rangle_t$ to $\dfrac{\langle p_t^2 \rangle_{d_{SR}}}{\langle p^2 \rangle_{1\mathrm{m}}}$.

p257, beginning 4 lines under Equation (5.49), delete the following sentence. " The modulus of the spherical wave reflection coefficient, $|Q|$ and the phase angle, α_s, represent the complex conjugate of Q', which, in turn, is defined by Equation (5.23) and the following text."

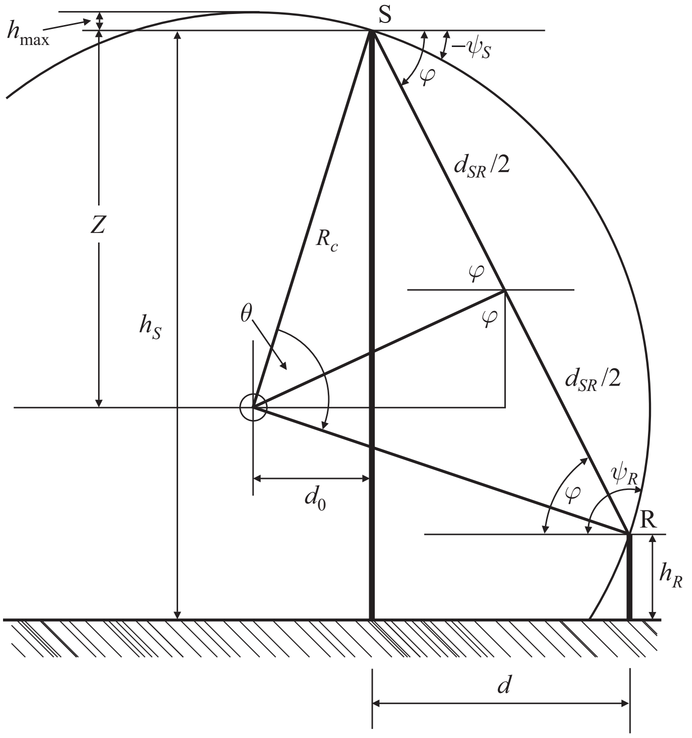
p262, 3 lines above Section 5.3.3, in order to be consistent with more commonly used base-10 filters, replace $2^{1/2b} - 2^{-1/2b}$ with $10^{3/20b} - 10^{-3/20b}$.

p262, line immediately above Section 5.3.3, change 0.23156 to 0.230768 and change 0.7071 to 0.704592.

p264, 2 lines above Equation (5.70), remove "Equation (5.25)," and in 1 line above Equation (5.70), add "(see Equation (5.25))" after "waves".

p272, first line after Equation (5.83), after "where " add "$B_m = U_0/\log_{\mathrm{e}}[(z_r/z_0) + 1]$, A_m is defined in Equation (5.76d) and ".

p276, replace Figure 5.9 with the following, showing a different definition of Z.



p277, second line from the top, add "is" after "it" at the end of the line.

p280, first line following Figure 5.11 caption, after "(5.102)", add "with z_i^2 replaced with $(z_i - \tilde{z})^2$."

p281, Equation (5.117) only applies to flat ground. For sloping ground, we need to calculate a new launch angle for the reflected ray relative to the horizontal. To do this, we use Equation (5.108) to calculate the incidence angle relative to the local ground plane. Then we subtract this angle (which should be greater than $\pi/2$) from π. We then add twice the ground slope to the result (taking the sign of the slope into account) to get the reflected ray launch angle (relative to the horizontal). If the launch angle is greater than $\pi/2$, no reflected ray exists that will arrive at the receiver.

p285, In Equation (5.127) change $\partial c/\partial z$ to $\mathrm{d}c/\mathrm{d}z$ in two places.

p286, last line, change the first ψ_{S2} to ψ_{R2}.

p287, first line, change the first ψ_{S2} to ψ_{R2}.

p325, 2 lines above Equation (5.230), change 1– –8 to 1 – 8.

p329, Following the end of the third line from the top, for clarification, we may write "The excess attenuation term, $A_{\rm ref}$ for reflection from a vertical surface (which may be added arithmetically to the RHS of Equation (5.219)) may be written as:

$$A_{\mathrm{ref}} = -10\log_{10}\left[1 + \left(\frac{d_{SR}}{r_S + r_R}\right)^2 (1-\alpha_r)10^{\mathrm{DI}_r/10}\right] \quad \text{(dB)}$$

where d_{SR} is the straight-line distance from the source to the receiver and $r_S + r_R$ is the distance from source to receiver around the diffraction edge."

p331, last paragraph, second line add "(see Section 5.7.1.7)" at the end of the first sentence and remove the next two sentences. In the first line, change A_r to A_{ref}.

p331, Equation (5.243), change A_r to A_{ref}.

p334, 4 lines above equation (5.259), change Equation (5.253) to Equation (5.254).

p334, Line under Equation (5.260), change "inverse" to "reciprocal".

p337, Equation(5.267), the second and third lines should be multiplied by -1.

p338, First dot point, it is not straightforward to adapt Equation (5.156) to this situation. It is better to use the following equations to find the coordinates of the image source, imaged across the mean ground plane. Consistent with the analysis on page 333, the x-coordinate is the horizontal coordinate in the direction from source to receiver and the z-coordinate is the height above an arbitrary datum. The x and z coordinates of the source are denoted x_{SE} and z_{SE}, respectively and those of the receiver are x_{RE} and z_{RE}.

The image source coordinates are denoted x'_{SE} and z'_{SE}, where
$x'_{SE} = [2(x_{SE} + az_{SE} - ab)/(a^2 + 1)] - x_{SE}$
$z'_{SE} = [2a(x_{SE} + az_{SE} - ab)/(a^2 + 1)] + 2b - z_{SE}$
where a and b are defined on page 333. The image receiver coordinates are found in a similar way, by replacing the subscript, S with R in the above equations.

p339, 6^{th} line from the top, replace "Section 5.1.7.2" with "Sections 5.1.7.2, 5.1.7.3 and 5.1.7.4".

p339, 3rd black dot point see p338 comment.

p339, 4^{th} line above equation (5.274), change "Equation (1.11.3) to "Equation (1.98)".

p340, Section 5.7.2, Remove the sentence beginning on the 8th line under the heading and replace the remainder of the section with: "The excess attenuation, A_r, due to reflection from a vertical surface is:

$$A_{\mathrm{ref}} = -10\log_{10}\left[1 + \left(\frac{d_{SR}}{r_S + r_R}\right)^2 (1-\alpha_r)\right] \quad \text{(dB)}$$

where d_{SR} is the straight-line distance from source to receiver and $r_S + r_R$ is the distance from source to receiver around the diffraction edge."

p424, 4 lines under section 7.2.6.1 heading, replace "0.23156" with "0.230768".

p426, Equation (7.65), LHS should be ω_0 OR RHS should be divided by 2π (see page 281 in the reference).

p427, 3 lines under Equation (7.72), replace "0.23156" with "0.230768" and replace "0.7071" with "0.704592".

p500, 6 lines from the top of the page, a is the radius of the expansion chamber and k is the wavenumber.

p508, line above Eq (8.140), change "Eq. 13" to "Eq. 11".

p508, Replace Equation (8.141) with the following equation and replace the definitions of Z_{A1} and Z_{An} below the equation with $Z_{A1} = \rho c/S_u$ and $Z_{An} = \rho c/S_d$.

$$\mathrm{TL} = 10\log_{10}\left[\left\{\frac{1+M_n}{1+M_1}\right\}^2 \left(\frac{1}{4}\right)\left(\frac{Z_{A1}}{Z_{An}}\right)\left|T_{11} + \frac{T_{12}}{Z_{A1}} + Z_{An}T_{21} + \frac{Z_{An}T_{22}}{Z_{A1}}\right|^2\right]$$

p511, Figure 8.18, remove the S_{duct} labels and in the caption, remove "where $S_2 = S_3 - S_1$".

p512, Figure 8.19 caption, add "where $S_2 = |S_3 - S_1|$" to the end of the caption.

p512, Figure 8.19(a), interchange S_1 and S_3.

p515, multiply the RHS of Equation (8.162) by $(1 - M^2)$ when flow of Mach number M is present.

p517, multiply the RHS of Equation (8.168) by -1.

p519, Equation (8.185), remove ρc from the left and right hand sides of the equation (makes the equation compatible with Equation (8.133)).

p519, Equation (8.187), multiply the right hand side by the characteristic impedance, $(\rho c/S_1)$ and in Equation (8.188), divide the right hand side by the characteristic impedance, $(\rho c/S_1)$.
When there is flow through the muffler (M_1 non zero and $M_2 = 0$), the transfer matrix of Equation (8.185) must be replaced by (Munjal (2014), p. 126):

$$\begin{bmatrix} 1 & M_1\rho c/S_1 \\ M_1 S_1/\rho c & 1 \end{bmatrix}\begin{bmatrix} T_a & T_b \\ T_c & T_d \end{bmatrix}$$

p519, Add the following after the first line following Equation (8.196).
The lengths, L_a, L_b and L_c used in Equations on pages 518 and 519 are the optimal

acoustic lengths and are calculated from the chamber length, L, using the following equations (see Equations (11), (17), (18) and (19) in Ramya and Munjal, “Improved tuning of the extended concentric tube resonator for wide-band transmission loss”, Noise Control Engineering Journal, 62(4), 252–263).

$$L_a = (L/2) - \Delta_{1D}$$
$$L_b = (L/4) - \Delta_{1D}$$
$$L_c = (L/4) + 2\Delta_{1D}$$

where

$$\begin{aligned}\Delta_{1D} = 10^{-5} &\left[1 - 4.278\left(P_{\text{open}}/100\right)^{-0.5454}\right]\left[1 + 59.89 t_w^{0.6891}\right] \\ &\times \left[1 - 306.61 d_1^{0.497}\right]\left[1 + 75.98 d_h\right]\left[1 - 1.124(d_2/d_1)^{-2.95}\right] \\ &\times \left[1 + 1.623 \times 10^{-4} L^{-3.197}\right]\end{aligned}$$

Note that Equations (8.197) to (8.200) in the textbook are used to calculate the geometric lengths corresponding to the optimal acoustic lengths.

p519, Equation (8.200), second line, replace d with $d_1$and multiply the RHS by $(1 - M^2)$ when flow of Mach number M is present.

p521, Equation (8.206) is the transmission matrix corresponding to particle (not volume) velocity. To convert this matrix to one compatible with volume velocity, divide T_{12} by πa^2 and multiply T_{21} by πa^2. The resulting volume velocity transmission matrix can then be used with the volume velocity based transmission matrices corresponding to other muffler elements to calculate the IL and TL of a muffler system.

p542, Additional information for perforated pipes. The friction factor is:
$f_m = 0.0304 + 0.15 \times P_{\text{open}}/100$ (DOI: 10.13140/RG.2.1.3426.5043).

p621, Line following Equation (10.22), add “fully expanded” before the word, “jet”.

p621, 2 lines above Equation (10.23), replace”flowing gas” with “fully expanded jet” and add “fully expanded” before the word, “jet”.

p621, 2 lines following Equation (10.23), replace “stream” with “fully expanded jet”.

p621, last line, add “fully expanded” before the word, “jet”.

p622, 5, 8 and 11 lines from the top, add “for air” after “1.89” and note for other gases, the critical ratio is defined as $[(\gamma + 1)/2]^{\gamma/(\gamma-1)}$.

p622, Figure 10.2 caption, add “air” before “jets”.

p623, line following Figure 10.3, replace “jet diameter” with “nozzle exit diameter”.

p711, Table 11.5, first row, change "1-D duct" to Semi-infinite 1-D duct" and change the equation to $\rho c/S_d$. Note that the impedance shown in the text is for an infinite duct excited internally well away from the ends.

p717, Table 11.7, In the "finite honeycomb-core sandwich panel" section, in the expression for $n_2(\omega)$, change G to G_c.

p.721, Equation (11.91a), change to $\eta_{12}^{\text{line}} = \dfrac{c_{g1} L \beta_{\text{corr}}}{2\omega S_1} \langle \tau_{12,\infty}^{\text{line}}(\theta) \cos\theta \rangle_\theta$.

p726, 3 lines under equation (12.1), replace "0.23156" with "0.230768".

p812, line immediately below Equation (E.3), change r_i/r_1 to r_1/r_i.

p812, Equation (E.7), change d to d_{SR}.

p812, Equation (E.8), replace the part including and following the $\approx$ symbol with $= 2\pi f \Delta t$.

p812, 2 lines under Equation (E.8), replace "horizontal separation distance" with "length of non-reflected ray path".

p813, Equation (E.10), following "$h_S/10$", add "≈ 0.1", following "$h_R/10$", add "≈ 0.1" and change "d" to "d_{SR}".

p813, Equation (E.12), change "d" to "d_{SR}".

p813, 2 lines under Equation (E.13), change "d is the horizontal" to "d_{SR} is the".

p855, Porter reference, the first sentence should be "The bellhop manual and user's guide."