

ENC Release Notes Version 3.5

June 1, 2011

FUTURE ADDITIONS FOR VERSIONS 3.6 AND 3.7 FOR 2011/12

1. In **Modules 3, 4, 5, 6 and 7**, when the graphs are saved only the last curve plotted is saved. This will be fixed so that all graphs plotted and displayed when the overlap button is "ON" will be saved.

Module 4 - Sound Transmission Loss

2. An extended materials list will be included to reflect the new list in the 4th edition.
3. The critical frequency data point will be added to the graphs to give a more representative result

Module 5 - Impedance

4. The statistical absorption coefficient calculation will be included with the perforated panel analysis.
5. More data points will be calculated for the impedance plots and a linear frequency scale choice (in addition to the current logarithmic frequency scale) will also be provided for the plots.

Module 5 - Reactive Mufflers

6. More data points will be calculated for the impedance plots and a linear frequency scale choice (in addition to the current logarithmic frequency scale) will also be provided for the plots.

Module 7 - Sound power and SPL estimation

7. Radiated noise calculations for supersonic jets will be included. Currently only subsonic jets are included.

ADDITIONS AND CORRECTIONS NEW IN VERSION 3.5

Two general additions have been made. First, it is now possible to import and export text file data into the tables in ENC so now data from a spreadsheet can be imported without having to re-type it. Second, it is now clearer which part of each module users are in as the page name on the menu bar is now highlighted in red.

Module 5 - Impedance

1. End corrections and effective lengths for all muffler elements have been revised in line with the 4th edition of the text book
2. The maximum valid frequency for the graphs has now been revised to include the extension due to wave analysis when that option is chosen.
3. It is now made clear that the analysis for the 1/4 wave tube is based on wave analysis rather than the less accurate lumped element analysis.
4. Where appropriate, the windows in the impedance page have been altered to reflect the windows in the reactive muffler page as closely as possible.

Module 5 - Reactive Mufflers

5. End corrections and effective lengths for all muffler elements have been revised in line with the 4th edition of the text book
6. The maximum valid frequency for the graphs has now been revised to include the extension due to wave analysis when that option is chosen.
7. It is now made clear that the analysis for the 1/4 wave tube is based on wave analysis rather than the less accurate lumped element analysis

Module 5 - Exhaust Stack Directivity

8. A new analytical model as described in the 4th edition text book has been added, as have new curves based on more extensive experimental data. This has replaced the current calculation procedure based on the 3rd edition text book

Module 7 - Sound power and SPL estimation

9. The air compressor pages has been rearranged so that only one page is used for each compressor type. Also the different calculation results for exterior noise of large compressors are explained in the manual.

VERSION 3.4

In addition to the changes listed below, some cosmetic changes to some of the windows have been made to make it clearer what ENC is doing and what parts of the input data are excluded from various calculations. It is recommended that the user become familiar with the new version of the user manual as well as the 4th edition text book.

Module 1 - Noise level Criteria

1. “Maximum allowed exposure time to L_{Aeq} (hours)” is now calculated in addition to the maximum allowed exposure to $L_{Aeq,8h}$.

Module 1 - Weighting Networks

2. A larger version of the graph can now be selected.

Module 2 - propagation

3. The Concave curves for the ground effect had the 2000 Hz and 63 Hz curves accidentally interchanged in the third edition of the text. This has now been fixed.
4. The excess attenuation effects of barriers, ground reflection and meteorological influences are now combined rather than added separately when a barrier exists. This means that when the barrier term is ticked, it is not possible to also tick the meteorological and ground effect boxes as these effects are included in the barrier calculations. The exception is the ISO method which subtracts the ground effect without the barrier from the barrier calculation prior to giving the result. However, this effectively cancels the ground effect without the barrier so ENC does this for you by greying out the ground effect tick box when you tick the barrier box for the ISO method as well.
5. If you select either the wind speed or the temperature gradient to be non-zero in the barrier pop-up window, then the Am row is greyed out and the numbers excluded from the sum.
6. As the ISO method is for worst case meteorological conditions, the Am row is greyed out whenever the ISO calculation method is selected so that meteorological effects cannot be included twice.
7. Some minor corrections to the ISO barrier attenuation calculations to more accurately reflect the standard have been made and follow the procedures outlined in section 8.5.2.4 of the 4th edition text book.

Module 3 - Porous material Absorber

8. The capability to calculate impedance and absorption coefficient for polyester materials and acoustic foam (low density and medium density) has now been added.
9. The capability to calculate impedance and absorption coefficient for a multi layered material has now been added.

10. The ability to estimate the flow resistance (in the absence of measured data) for fibreglass, rockwool and polyester has now been added.
11. Mach number of grazing flow was previously set to zero, regardless of the user entered value - constraint now removed.

Module 3 - Panel Absorber

12. For the empirical method, interpolation between the curves is now done by ENC so any design frequency and maximum absorption coefficient can be selected.

Module 4 - Partition

13. The frequency range of TL calculation has now been extended to well below the panel first resonance frequency.
14. A modification to the calculations of TL for “thick” walls has been added. so the maximum achievable TL at high frequencies is now limited by the wall thickness effect.
15. The data points exactly at the critical frequency are now listed in the calculation panel.

Module 4 - Double Wall

16. The data points exactly at the critical frequency are now listed in the calculation panel.
17. The ability for the user to enter any stud compliance value has been re-introduced.
18. Some minor adjustments to the Davy model to increase its accuracy in the critical frequency range have been made.

Module 4 - IIC and STC

19. A calculation of OITC (Outdoor Indoor Transmission Class) has now been included even though it is not discussed in the text book.
20. The error in Equation (8.21) in the 4th edition text book has been fixed. The "+" sign has been changed to a "-" sign and this is now reflected in ENC.
21. The frequency range for IIC calculations has been corrected to 100 Hz to 3150 Hz from 125 Hz to 4000 Hz.
22. ENC now also calculates the spectrum adaptation term to be included with IIC to account for bare wood or concrete floors or floors with inadequate covering.

Module 4 - Composite / Flanking

23. The effect of flanking on TL predictions has been included as well as the special case of suspended ceiling flanking.
24. Gompert's formula has been included for calculating the TL of very narrow slits.

Module 4 - Enclosure

25. Some labelling has been modified to make the meaning clearer.

Module 4 - Barrier

26. The tick box here and in the sound propagation module for "barrier is a building greater than 10 m high", has been removed as we do not need a special calculation for this case.
27. Intermediate results for the 1000 Hz calculation can now be displayed.

Module 5 - Impedance

28. An option has been added to calculate the resonance frequency of the Helmholtz resonator using 1-D wave analysis in addition to the lumped analysis that is in earlier versions. In addition, you can choose from three different lumped analysis expressions.
29. For Helmholtz resonators, in addition to the choices for calculating resonance frequency, you now have a choice of using 1-D wave analysis or lumped element analysis for the impedance calculations.
30. New, more accurate equations are used to calculate the end corrections for Helmholtz resonators and quarter wave tubes (Eqs. 9.45 - 9.47 in the 4th edition text book).
31. The vertical axis of the graphs has been re-labelled to make it clear that it is the normal impedance that is being calculated and plotted.
32. The partitioned/non-partitioned cavity choice has been removed from the perforated panel analysis as the normal impedance is not affected by whether the cavity is partitioned or not. However, the statistical absorption coefficient is affected and this will be an addition for a future version.

Module 5 - Reactive Mufflers

33. The ability to calculate TL in addition to IL of reactive mufflers has been added.
34. For Helmholtz resonators, in addition to the choices for calculating resonance frequency, you now have a choice of using 1-D wave analysis or lumped element analysis for the impedance calculations.
35. You are now given the choice of lumped analysis or wave analysis for the calculation of the IL of reactive mufflers.
36. New, more accurate equations are used to calculate the end corrections for Helmholtz resonators and quarter wave tubes (Eqs. 9.45 - 9.47 in the 4th edition text book).

Module 5 - Plenum

37. An additional calculation procedure (as used by ASHRAE) has been included.
38. For the Wells model, a factor has been added to account for the case of the edge of the inlet being closer to the centre than to the edge of the plenum chamber wall.

Module 6 - Single Isolator System

39. The calculation of the first 3 spring surge frequencies for a coil spring has been included.
40. The calculation of spring stiffness and mass for a coil spring has been included.
41. An option has been provided for the user to choose to include the mass of the coil spring in the calculations.

Module 7 - Sound Power and SPL Estimation - oil burner and low pressure drop gas

42. The error in this calculation as a result of an error in the 3rd edition text book has now been fixed (see Eq. 11.88, 4th Edn text).

Module 7 - Sound Power and SPL Estimation - Pipe flow

43. The internal sound power for vacuum lines is given by Equation 11.77 in the 4th edition text which is correct. The equation from the third edition used by previous versions of ENC had a constant of "1.2" in the equation instead of "0.5".
44. The default density for the outside gas has now been changed to 1.206.

Module 7 - Sound Power and SPL Estimation - axial compressors and centrifugal compressors > 75 kW

45. The constant "46" in Equation 11.2 in the 4th edition text is correct and supersedes the previous version where "45" was used.

VERSION 3.3

1. Most octave and 1/3 octave band results can now be exported to Excel.
2. The fonts have been adjusted so ENC works well with most wide screen monitors.

Module 1 - Noise level Criteria

3. 1/3 octave band NR curves have been added for use with 1/3 octave band data
4. RNC curves are now more accurately represented at low frequencies.

Module 1 - Fundamentals

5. The expression used for calculating the speed of sound in liquid in a thin walled pipe has been updated to one published recently by Pavic and given below

$$D_C = \frac{D_F}{1 + \frac{D_F}{E} \left(\frac{2R}{t} + \frac{\rho_w}{\rho} v^2 \right)}$$

Module 2 - Sound Propagation

6. The CONCAWE model for ground effect of figure 5.19 in the text book has been added and the text book figure has been corrected by swapping the 63 Hz and 2000 Hz labels.

Module 4 - IIC and STC

7. The 1/3 octave band frequency range has been extended down to 50 Hz and up to 5kHz because it affects the C and C_{tr} values.
8. A switch with 4 choices has been added to allow users to select the frequency range used for the C and C_{tr} values. The first choice is 50 Hz to 3150 Hz, the second choice is 100 Hz to 3150 Hz, the third choice is 50 Hz to 5000 Hz and the fourth choice is 100 Hz to 5000 Hz. When the first two options are selected, the $L_{i,1}$ values in Table 8.1 in the text are increased (made less negative) by 1 dB. The different choices only affect the C and C_{tr} values, not the R_w value.
9. Similarly the Octave band frequency range has been extended down to 63 Hz and up to 4 kHz.
10. A switch with 4 choices has been added so that users can choose between the four ranges 63 Hz to 2000 Hz, 125 Hz to 2000 Hz, 63 Hz to 4000 Hz and 125 Hz to 4000 Hz. When the first two options are selected, the $L_{i,1}$ values in Table 8.1 must be increased (made less negative) by 1 dB. The different choices only affect the C and C_{tr} values, not the R_w value.
11. Condition 2 only (not condition 1) on page 344 in the text is now satisfied in the R_w calculation and the 100 Hz 1/3 octave band is now included in the calculation.

12. The error in ENC in the calculation of octave band IIC value whereby 5 dB is subtracted has been fixed. Now ENC does not subtract 5 dB as stated in the text book on page 347 and the curves used to calculate the octave band IIC now correctly have the value at 2000 Hz increased by 1 dB.
13. The calculation of Weighted Standardised Impact Sound Pressure Level, $L_{nT,w}$, is now included.

Module 6 - Two-stage isolator

14. Some labels have been changed to more accurately reflect their meaning.

Module 6 - Vibration absorber

15. the error in Equation 10.47 in the text book (3rd) and repeated in ENC has been fixed by replacing the quantity, (m_2/m_1) in the top line (numerator) by $(m_2/m_1)^3$
16. Minor errors in labelling have been corrected.

VERSION 3.211

Module 4 – Partition

1. The error in the Davy transmission loss model around the critical frequency for a single panel has been fixed.
2. The locking up of the materials list as a result of scrolling too fast has been fixed.
3. The confusion arising from changing a property of an existing material and then trying to save it has been fixed.
4. The loss factor line in the input data table when “composite panel” is selected is “greyed out” as the loss factor for the composite panel is entered as a single number below the input table.

VERSION 3.21

Module 4 – Double wall

1. The double wall TL in the vicinity of the critical frequencies has been modified.
2. In the double wall TL prediction using the Davy model, the user input for stud compliance has been removed, leaving only the choice between wood and steel studs.

In addition, the Davy model has been revised in line with the equations and text below:

The structure-borne sound transmission coefficient for all frequencies above f_0 is (Davy, 1993):

$$\tau_{F_c} = \frac{64\rho^2 c^3 D}{2g^2 b (2\pi f)^2}$$

where b is the spacing between the studs and for line support on panel 2:

$$D = \begin{cases} \frac{2}{h} & \text{if } f < 0.9 \times \min(f_{c1}, f_{c2}) \\ \frac{\pi f_{c1}}{8f\eta_1\eta_2} \sqrt{\frac{f_{c2}}{f}} & \text{if } f > \max(f_{c1}, f_{c2}) \\ \text{linear interpolation on plot} & \text{if } 0.9 \times \min(f_{c1}, f_{c2}) \leq f \leq \max(f_{c1}, f_{c2}) \\ \text{of TL vs } \log_{10} \text{ frequency} & \end{cases}$$

$$h = \left[1 - \left(\frac{f}{f_{c1}} \right)^2 \right]^2 \left[1 - \left(\frac{f}{f_{c2}} \right)^2 \right]^2$$

where f_{c1} is the lower of the two critical frequencies corresponding to the two panels

and η_1 and η_2 are the loss factors for panels 1 and 2 respectively. Note that the first equation on the previous page applies only to wooden studs. For steel studs, the numerator should be divided by 10.

The above modifications were made as a result of extensive discussions with the originator of the Davy theory, Dr John Davy, and give a better match between theory and experiment.

3. The Sharp model for double wall transmission loss has been modified slightly in that point B in Figure 8.9 in the text is $0.5 f_{c1}$ instead of $0.5 f_{c2}$ and the equations in the figure caption have been changed to:

- (a) Line–line support:

$$TL_{B2} = 20 \log_{10} m_1 + 10 \log_{10} b + 20 \log_{10} f_{c1} + 10 \log_{10} f_{c2} + 20 \log_{10} \left[1 + \frac{m_2 f_{c1}^{1/2}}{m_1 f_{c2}^{1/2}} \right] - 78 \quad (\text{dB})$$

- (b) Line–point support (f_{c2} is the critical frequency of the point supported panel):

$$TL_{B2} = 20 \log_{10} m_1 e + 20 \log_{10} f_{c1} + 20 \log_{10} f_{c2} - 99 \quad (\text{dB})$$

- (c) Point–point support:

$$TL_{B2} = 20 \log_{10} m_1 e + 20 \log_{10} f_{c1} + 20 \log_{10} (f_{c2}) + 20 \log_{10} \left(1 + \frac{m_2 f_{c1}}{m_1 f_{c2}} \right) - 105 \quad (\text{dB})$$

Point C:

$$(a) \quad f_{c2} \neq f_{c1}, \quad TL_C = TL_B + 6 + 10 \log_{10} \eta_2 + 20 \log_{10} \frac{f_{c2}}{f_{c1}} \quad (\text{dB})$$

$$(b) \quad f_{c2} = f_{c1}, \quad TL_C = TL_B + 6 + 10 \log_{10} \eta_2 + 5 \log_{10} \eta_1 \quad (\text{dB})$$

The above adjustments result in better agreement between experimental data and predictions for double walls.

VERSION 3.2

The following additions and corrections are included in version 3.2.

1. Two new windows have been added to Module 5 called "Duct Modal" and "Plenum" (see below)

Module 5 – Duct modal

2. This module allows you to calculate modal cut-on frequencies, number of cut-on modes for a specified frequency and the phase speed of a specified mode at a specified frequency for rectangular and circular ducts.
3. This module also allows the calculation of the attenuation of sound propagating in unlined ducts, with or without external lagging.

Module 5 – Dissipative Mufflers

4. The exit loss calculation has now been replaced with the more accurate table 9.5, p464 and an equivalent diameter is calculated for rectangular ducts for use with this table.
5. The lined duct attenuation is now limited to 50 dB for a specified length of duct, which is realistic.
6. The plenum chamber panel has been removed and included as "Wells model" in the "Plenum" window (see below).

Module 5 – Plenum

7. This window allows the calculation of the transmission loss of a plenum chamber with and without a central partition, and with and without an acoustic material lining, using a number of different models available in the literature (Wells, Cummins and Ih). Note that if the TL is greater than 5dB it is the same as the Insertion Loss.

Module 6 – 2-Stage Isolator

8. A new window has been added to module 6 which allows calculation and plotting of the performance of a two-stage vibration isolator, including calculation of the two undamped resonance frequencies.

VERSION 3.1

The following additions and corrections are included in version 3.1.

1. Some more entries have been included in the “conversions” table under <tools> <unit conversion calculator>.
2. There were some places where a sound level of -inf was added to finite sound levels giving an incorrect result due to incorrect handling of the -inf quantity. This has now been fixed.

Module 2 - Sound propagation

3. When you click on Ag and the ground effect window pops up, in version 3.0 and earlier there is a slight error in the ISO 9613-2 method. In particular, the error in the calculation of d_s and d_r has now been fixed (in the textbook, "0.09" has now been replaced with "0.9" in Equation 5.181 in accordance with the standard).

Module 7 - Sound power and SPL estimation

4. In the equipment selection "furnaces - oil burner and low pressure drop gas burner" there are a number of input data label corrections that have been made to make data entry less confusing and more user friendly. In addition, the SPL at 1m is now for a combination of all burner noise sources and not just the air jet source. An error in the sound power estimation of noise due to primary and secondary air flow. Also in this window, when

one sets the air flow rate to zero, a value of $-\infty$ dB is obtained for the air flow noise as expected. However the error of $-\infty$ dB for the total noise has now been fixed.

5. For all of this module, version 3 assumed that the ambient conditions were a speed of sound of 343 m/s and a product of speed of sound and density of 400. Now it is possible to enter environmental conditions using the "constants" button so that the actual speed of sound and air density are used in the calculations.
6. The total sound power levels for cooling towers, pumps, large compressor interior noise levels, large compressor exterior noise levels, boilers, turbines, furnaces, electric motors, generators, transformers and gears are now exactly equal to the sum of the octave band levels in each case. This was not always the case previously due to some anomalies with the octave band correction procedure.
7. For Cooling towers, Table 11.9 in the text for calculating close in sound pressure levels is now included.
8. For jet noise, the user no longer needs to choose whether to output sound power or sound pressure level at a specified location because both calculations are now done simultaneously.

Module 7 - Road traffic noise (CoRTN)

9. There is a new window in module 7 that allows the calculation of road traffic noise according to the CoRTN model that was developed in the UK by the Dept of Transport.

Module 7 - Road traffic noise (USA FHWA-TNM)

10. There is a new window in module 7 that allows the calculation of road traffic noise according to the United States FHWA Traffic noise model. However, the data base provided by the FHWA is not included in ENC. Users are required to enter their own vehicle emission noise levels (maximum sound pressure level emitted during a vehicle pass by at a distance of 15 m). There is a data base of noise levels provided in the FHWA traffic noise model technical manual.

Module 7 - Rail traffic noise (UK-DoT)

11. There is a new window in module 7 that allows the calculation of rail traffic noise according to the model that was developed in the UK by the Dept of Transport.

VERSION 3.0

The following are additions over what was included in Version 2.2

1. A USB network dongle is now available.

Module 4 - Partition

2. In addition to STC, being indicated beneath the graph, all the ISO descriptors, R_w , C and C_{tr} are now shown. In addition these descriptors now apply to the curve which has the

cursor on it rather than the last one drawn. However, if the cursor is never turned on, the descriptors apply to the last curve drawn. If the cursor is turned on and then off, the descriptors will apply to the curve where the cursor was located prior to it being turned off.

3. Multi-leaf partition data entry has been reorganised so the total thickness of the panel is entered and then the thickness and material properties of the thickest panel are entered separately.
4. Multi-leaf partitions which are rigidly connected are now treated as a single partition with a thickness equal to the total thickness. So the thickness data in the "Thickest leaf" table of data are automatically adjusted so the leaf thickness is equal to the total thickness entered in the "multi-leaf" box.
5. It is now possible to calculate the TL for panels of 2 layers of different materials which are rigidly connected for both isotropic and orthotropic panels.
6. A number of intermediate calculation results were previously provided. To these has been added the bending wave speed at a user specified frequency (two wave speeds for orthotropic panels). These intermediate results have also been made easier to read.

Module 4 - Double wall

7. Similar capabilities have been added to the double wall as for the single partition. In contrast to the single partition, there is no separate window for adding new material definitions. This is simply done by directly changing the values in the data table and saving to a new file.
8. As for the single partition, in addition to STC, being indicated beneath the graph, all the ISO descriptors, R_w , C and C_{tr} are now shown. In addition these descriptors now apply to the curve which has the cursor on it rather than the last one drawn.

Module 4 - IIC and STC

9. An entire new window has been added to allow calculation of IIC, STC and R_w . These can be calculated either by entering the 1/3 octave band values for TL, IIC or R_w directly or in the case of TL and R_w , you can enter the data from the reverberation room measurement (sound pressure levels on either side of the panel and reverberation times or average sound absorption coefficients for the receiver room).

Module 4 - Composite Panel

10. Determination of the effect on overall TL of a crack around a window or under a door is now possible.
11. A 1/3 octave band option has been added as an option to both the table and the graph.
12. The EASY-TL calculator has been modified to avoid the need for right clicking.

Module 4 - Enclosure

13. The effect of medium density liner on the TL of an enclosure panel can now be included if desired by the user (only important at 2kHz and above).
14. Calculations of the sound pressure level immediately outside the enclosure and also at some distance from it (for enclosures located both outdoors and in a building), together with the calculations of the sound pressure levels with no enclosure present are now available in an octave band table. The source (around which the enclosure is to be built) sound power is also a line in the table. You have a choice as to which of the above quantities you would like to specify as the input and ENC will calculate all the other quantities. You can also specify a directivity factor for the source and the enclosure.
15. The sound power reduction of a partial enclosure can now be calculated in this window.

Module 4 - Outdoor barrier

16. Three methods in addition to the Maekawa method have been added for calculating barrier attenuation. These are the Menounou method (text, p390), the Kurze and Allen method (text, p390) and the ISO method (text, p400).
17. Intermediate results for the barrier calculations can now be displayed.
18. Double edge diffraction and two parallel barriers can now be analysed using the ISO method.
19. 1/3 octave values are now plotted on the graph and can be read with the cursor.

Module 5 - Dissipative Muffler

20. Calculation of lined duct attenuation is now much faster and no black box appears in the screen centre during the calculation
21. Exit loss from the 2nd edition textbook has been replaced with data from table 9.5, p464 in the 3rd edn. text.
22. The lined duct attenuation has been limited to a maximum of 50 dB total.

Module 5 - Pressure Drop

23. This window has now been merged with the "flow noise" window to make room for two new windows to appear in version 3.1.

VERSION 2.2

1. Graph borders in Modules 1, 2 and 3 have been improved so the quality of the printout is better.
2. The user can now select the maximum and minimum values on the y-axis scale for most graphs in modules 1, 2 and 3. Also in most cases, the user can also select the number of y-axis increments desired on the graph to avoid undesirable numbers on the y-axis scale.

3. On-line help files have been updated and expanded.

Module 3 - Room Modal Properties

4. Spatial standard deviation of the sound pressure level (dB) is now included.
5. Effective intensity and energy density are now calculated.
6. The resonance frequencies for the cylindrical shaped room are now calculated accurately instead of relying on the grossly inaccurate approximations provided in “Vibration and Sound” by P.M. Morse (1948). The user guide is now much more expansive on this topic.
7. The calculation of cross-over frequency for both rectangular and cylindrical rooms has been extended to include tones and bands of noise less than 1/3 octave wide.

Module 3 - Sound in Rooms

8. This main window has been rearranged to separate steady state calculations from transient calculations.
9. Fitzroy, Fitzroy-Kuttruff and Neubauer equations for calculating T_{60} and absorption coefficient have been added for flat and long rooms as well as Sabine rooms.
10. In the Sabine room panel, users can now change SPL_r as well and this will affect all other parameters except source power output.
11. A window has been added to allow the calculation of Sabine absorption coefficient for a sample of material in a reverberation room.

Module 3 - Porous material absorber

12. This main window has been completely rearranged to include the display of more results and to allow the calculation of more quantities.
13. Calculations of NRC are now provided and an NRC calculator has also been added.
14. Calculations of normal incidence and statistical absorption coefficients of a material can now be made from impedance tube standing wave measurements as well as from flow resistance data.
15. The graph is now able to plot all calculated quantities for both impedance tube approach and the flow resistance approach.

Module 3 - Panel absorber

16. The ability to undertake 1/3 octave band calculations as well as octave band calculations has been added.
17. The result for $f_{1,1}$ (first resonance frequency) of the panel is now displayed.

Module 3 – Applications

18. This main window has been rearranged to include the display of more results and to allow the calculation of more quantities.
19. Occupied and unoccupied class rooms have now been added to the optimum reverberation time menu.
20. A separate panel has been developed so that you can enter measured or estimated early decay times, C_{80} values and average sound pressure levels for frequencies between 125 Hz and 4000 Hz for unoccupied concert halls and ENC will then calculate the corresponding quantity for an occupied hall.
21. A panel has been added for calculating auditoria reverberation times from Sabine absorption coefficients in octave bands - absorption of the audience may also be easily included.

VERSION 2.11

Module 5 - Exhaust stack

1. The bug in the calculation of sound pressure level at a distance has been fixed. Previous versions of the software subtracted $\log(4\pi r^2)$ instead of $10\log(4\pi r^2)$ when calculating sound pressure level from stack exhaust sound power level.

VERSION 2.1

Module 5 - Impedance and Module 5 - Reactive Mufflers

1. The calculation of the end correction for Helmholtz resonator necks has been modified. For the end adjacent to the resonator chamber, the condition that if $\zeta < 0.333$, $\zeta = 0$ when using Equation (9.16) in the text to calculate the end correction has been removed and additional conditions have been added. These are:
 1. If $\zeta > 0.8$, $\zeta = 0.8$
 2. $\zeta > 0.6$, a message pops up warning that the calculation is inaccurate
2. For the calculation of the end correction for the end mounted to the wall of a duct, Equation (9.16) in the text is still used, except that now ζ is set equal to 0 instead of equal to the ratio of neck diameter to duct diameter. This result agrees better with experimental data.

Module 5 - Lined Ducts

3. The problem of negative and minus infinity attenuations for some low frequency calculations has been fixed.

VERSION 2.0

The following are additions for version 2.0 over what was in version 1.30

Module 1 - Fundamental calculations

1. A panel that relates wavenumber, wavelength, frequency and speed of sound has been added.
2. A panel has been added allowing the calculation of the following quantities for both plane and spherical waves at a specified distance, given the sound pressure level.
 - a. Sound pressure
 - b. Sound intensity
 - c. Sound intensity level
 - d. Reactive intensity amplitude
 - e. Particle velocity
 - f. Total energy density
 - g. Potential energy density
 - h. Kinetic energy density

3. A panel has been added to calculate the speed of sound for a liquid in a thin-walled tube.

Module 1 - Noise level criteria

4. Can now get rid of curves on the plot by clicking on a coloured button a second time or clicking on the “NC”, “NR” etc labels a second time.
5. RNC curves have been added to the others that are available to be superimposed on the plot

Module 1 - Weighting Networks (new window)

6. This window allows calculations to be done on full octave band or 1/3 octave band spectra in the range 10 Hz to 20 kHz. You can add spectrum levels, subtract levels, apply A, B or C-weighting to the spectra, calculate overall weighted and unweighted levels and plot the spectra and weighting curves.

Module 1 - Noise Descriptors (new window)

7. This window allows you to calculate various noise descriptors, given hourly L_{Aeq} data or times of exposure to various noise levels. The quantities calculated are $L_{Aeq,T}$, $L_{Aeq,8h}$, $E_{A,T}$, SEL, CNEL, L_{dn} . Noise impact quantities, NII and TWP are also calculated.
8. A window for calculating material flow resistance and flow resistivity from material properties is also provided.
9. A speech privacy calculator is also provided to estimate the intelligibility of speech between adjacent rooms in a building.

Module 2 - Sound sources

10. A new panel has been added to calculate the sound radiated from a body subject to vortex impingement in a turbulent flow.

Module 2 - Plane sources (new window)

11. A new window includes piston and incoherent plane sources. Radiated sound intensity, sound power as well as sound pressure on-axis in the near and far field and both on and off-axis in the far field are calculated.
12. For the piston source a plot of the real and imaginary parts of the normalized radiation impedance (radiation efficiency) is provided.
13. A panel has also been added for calculating the sound field radiated by a building.

Module 2 - Sound propagation

14. The excess attenuation results in the lower part of the central panel have been rearranged so there is only one line for each type of excess attenuation. Where there is more than one model available to calculate the excess attenuation (ground and meteorological effects), the choice of model is made in the relevant panel on the right hand side of the window. Detailed results for each model used in the excess attenuations are now provided in a pop up window which appears when you click in the excess attenuation character on the left of the central panel.
15. For ground effect, detailed results include reflection coefficients (spherical and plane), turbulence parameters and results for locally and extended reactive ground.
16. For meteorological effects, there is now a choice between 6 different models with detailed results shown for each model on the pop up window. The ISO standard is also included. A shadow zone calculation is now available as well as results from the other meteorological effects models. Table numbers have been updated to reflect the third edition of the text book.
17. For barriers, the calculation of the effect of wind and temperature gradients has been updated as in the third edition of the textbook so it is consistent with the procedures used in the calculation of the excess attenuation due to meteorological effects.
18. Excess attenuations due to housing, forests and process equipment can now be calculated and are included as separate lines in the table.
19. In the barrier calculation, if the barrier is a building greater than 10 m high, the first of the two terms in Eq. 1.97 is now deleted for the calculation.

Module 2 - Sound Power

20. In the far right panel, there is now a button which you can click on to produce a plot of radiation efficiency vs frequency for the specified vibrating panel.
21. In all panels, you can select “octave” to enable calculations to be done simultaneously in all octave bands and the results plotted.

Module 7 - Compressors, cooling towers, pumps, boilers, furnaces, electric motors, generators and gears.

22. Previously overall levels calculated using the equations in the text were adjusted so that the octave band values added up to the overall levels calculated using the specified equation. Now this is no longer done in cases where the octave band levels add up to less than the overall levels in recognition that some energy exists below the 31.5 Hz octave band and above the 8 kHz octave band. In cases where the octave band levels add up to slightly more than the overall level (due to rounding of the octave band correction values to the nearest whole number), the octave band levels have been adjusted slightly by a fraction of a dB so they add up to the overall level calculated with the appropriate equation.

Module 7 - Cooling towers

23. The results have now been presented a little differently to avoid the confusion caused by adding directivity index values to overall sound power levels to calculate the sound pressure levels in a given direction. Now the overall sound power levels are given and the directivity indices are listed separately so that they can be added to any sound pressure levels that are calculated from the given sound power levels.