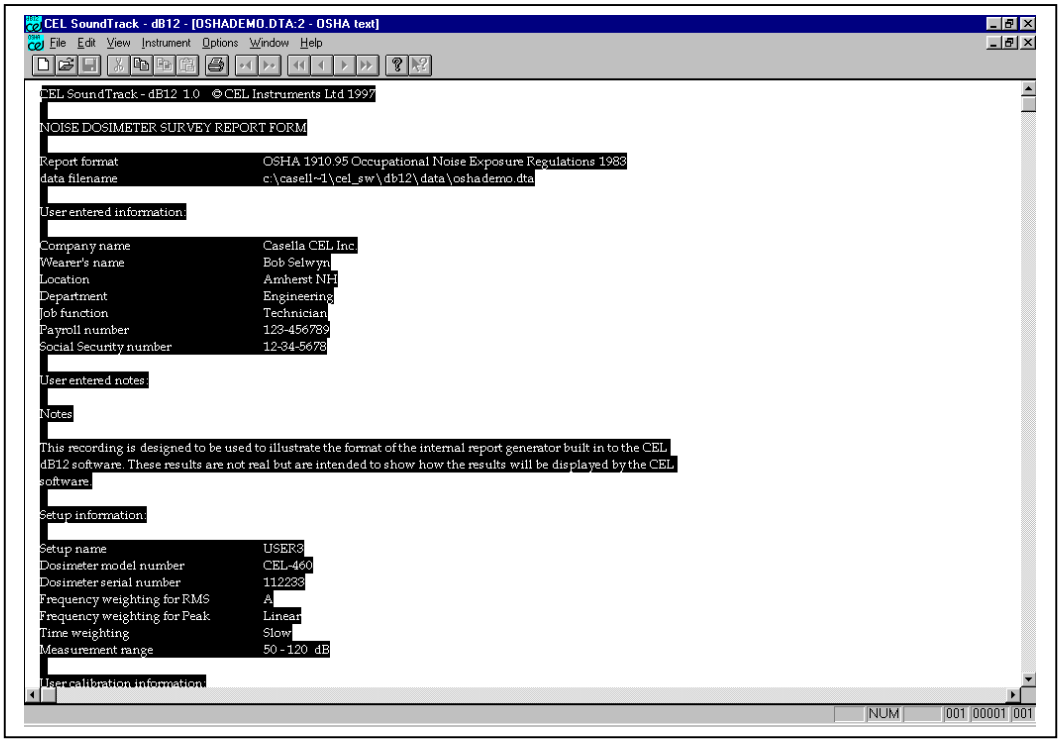
# What do all the terms mean in the CEL dB12 software

Consider the example of the standard OSHA report formatted from CEL-6704 dB12 (or from CEL-6702 dB10) software using the demonstration data file OSHADEMO.DTA

To obtain the following report start dB12 and select FILE|OPEN DATA FILE. The "Open an existing datafile" dialog box will appear. Navigate to the dB12/data sub-directory and highlight the file called "oshademo.dta". Click on the OK button or double click the filename to open the data file in dB12. The datafile will be shown in the Run Summary view as shown at the top of the window.

Select VIEW|OSHA TEXT to see the recording as a pre-formatted report laid out for use in the USA where the OSHA noise regulations apply. Make sure that the cursor is positioned at the top row in front of the first character on screen and select EDIT|SELECT / COPY ALL AFTER CURSOR. All the characters on screen will become highlighted.

Transfer to the word processor that you normally use, for example, Microsoft Word, and paste the text into a new document. The following pages show the text that is produced with an explanation of the purpose of each line in the report. The numbers at the start of each line are not displayed by the software but have been added to aid the explanation of the various terms and sections of the report.




Screen shot of dB12 showing the highlighted text using the VIEW|OSHA TEXT option

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1. CEL SoundTrack - dB12 1.0 © CEL Instruments Ltd 1997

2. NOISE DOSIMETER SURVEY REPORT FORM

| | | |
|---|---|---|
| 3. | Report format | OSHA 1910.95 Occupational Noise Exposure Regulations 1983 |
| 4. | data filename | c:\casell~1\cel_sw\db12\data\oshademo.dta |

5. User entered information:

| | | |
|---|---|---|
| 6. | Company name | Casella CEL Inc. |
| 7. | Wearer's name | Bob Selwyn |
| 8. | Location | Amherst NH |
| 9. | Department | Engineering |
| 10. | Job function | Technician |
| 11. | Payroll number | 123-456789 |
| 12. | Social Security number | 12-34-5678 |

13. User entered notes:

14. Notes

15. This recording is designed to illustrate the detail of the format of the internal report generator built in to the CEL dB12 software when downloading results from a data logging CEL-460 Noise Dosimeter. The results shown below are not real but are intended to show how the measurements will be displayed by the CEL software. Both the dB10 and dB12 software packages have this built-in report generator to present the measured results in a standard format. Since there is a large amount of information available it is important that the user is aware of the significance of each line in the report. Please consult the Operator's Manual for the CEL dosimeter and the CEL software for further information or call your local CEL Sales office. In the USA dial (800) 366-2966 or (877) 299-2966 for specific assistance in interpreting these figures.

16. Setup information:

| | | |
|---|---|---|
| 17. | Setup name | USER3 |
| 18. | Dosimeter model number | CEL-460 |
| 19. | Dosimeter serial number | 112233 |
| 20. | Frequency weighting for RMS | A |
| 21. | Frequency weighting for Peak | Linear |
| 22. | Time weighting | Slow |
| 23. | Measurement range | 50 - 120 dB |

24. User calibration information:

| | | | |
|---|---|---|---|
| 25. | Instrument last checked on | 08/15/1997 | 10:42:18 |
| 26. | Microphone serial number | 1006053 | |

| | | | |
|---|---|---|---|
| 27. | Logging times: | | Duration |
| 28. | | mm/dd/yyyy | hh:mm:ss hh:mm:ss.ss |
| 29. | Start of run | 08/15/1997 | 10:46:00 |
| 30. | End of run | 08/15/1997 | 12:16:00 |
| 31. | Duration of run | | 01:30:00.00 |
| 32. | Duration of pause | | 00:00:00.00 |

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33. Results of measurements:

| | | |
|---|---|---|
| 34. Lower threshold LOSHA1 | 69.5 dB Threshold 80 dB; Criterion 90 dB; Q = 5 | |
| 35. Upper threshold LOSHA2 | 68.9 dB Threshold 90 dB; Criterion 90 dB; Q = 5 | |
| 36. Equivalent sound level Leq | 85.3 dB Q = 3 | |
| 37. Sound exposure level SEL | 122.7 dB No threshold; No criterion; Q = 3 | |
| | | |
| 38. Threshold level | 80 dB | 90 dB |
| 39. Criterion level | 90 dB | 90 dB |
| 40. Exchange rate Q | 5 | 5 |
| 41. Actual measured dose | 1.0895 % | 1.0116 % |
| 42. 8 Hour projected dose | 5.8107 % | 5.395 % |
| 43. Average sound level Lavg | 69.5 dB | 68.9 dB |
| 44. Time weighted average level TWA | 57.4 dB | 56.9 dB |
| 45. User specified projected period | 12:00 hh:mm | 12:00 hh:mm |
| 46. User specified projected dose | 8.7161 % | 8.0925 % |

47. Results for the user specified threshold and criterion:

| | | |
|---|---|---|
| 48. Threshold level | 80 dB | 80 dB |
| 49. Criterion level | 90 dB | 90 dB |
| 50. Exchange rate Q | 3 | 5 |
| 51. Actual measured dose | 6.3496 % | 1.0895 % |
| 52. 8 Hour projected dose | 33.864 % | 5.8107 % |
| 53. Average sound level Lavg | 85.3 dB | 69.5 dB |
| 54. Time weighted average level TWA | 78.0 dB | 57.4 dB |
| 55. User specified projected period | 12:00 hh:mm | 12:00 hh:mm |
| 56. User specified projected dose | 50.797 % | 8.7161 % |

57. Exceedance times:

| | | |
|---|---|---|
| 58. | hh:mm:ss.ss | for % of run |
| 59. Time under range | 00:00:00.00 | 0.00 % |
| 60. Above or equal to 70 dB | 00:08:31.32 | 9.47 % |
| 61. Above or equal to 85 dB | 00:00:58.79 | 1.09 % |
| 62. Above or equal to 90 dB | 00:00:40.46 | 0.75 % |
| 63. Above or equal to 100 dB | 00:00:20.54 | 0.38 % |
| 64. Above or equal to 115 dB | 00:00:02.21 | 0.04 % |
| 65. Above or equal to 140 dB | n.a. | |
| 66. Time over range | 00:00:00.00 | 0.00 % |
| 67. Above or equal to user specified level | 00:00:58.79 | 1.09 % |
| 68. User specified level | 85 dB | |

69. Maximum exceedance levels:

| | | |
|---|---|---|
| 70. | | at mm/dd/yyyy hh:mm:ss |
| 71. RMS maximum level (Slow) | 116.0 dB | at 08/15/1997 10:56:14 |
| 72. Peak exceedance level | 124.2 dB | at 08/15/1997 10:55:58 |

73. Statistical exeedance levels:

| | |
|---|---|
| 74. L10.0% | 69.5 dB |
| 75. L50.0% | 61.5 dB |
| 76. L90.0% | 53.5 dB |
| 77. L95.0% | 52.0 dB |
| 78. L99.0% | 51.0 dB |

79. Time history profiles:

| | |
|---|---|
| 80. Profiles | On |
| 81. Profile sample interval | 1 s |
| 82. Profile function 1 | LAVG Q=5 S |
| 83. Profile function 2 | SPLMAX S |

The following notes refer to the line numbers shown on the two-page report above. Please refer to the standard OSHA text report when viewing the following explanations.

1. This line shows the name of the software package used to generate the report, the version number and the copyright information.
2. This line shows the purpose of the report.
3. This line shows the format of the report, in this case to present the information of the measurement according to the US OSHA Noise Regulations, 1983.
4. This line shows the full path name and the data file in use. All CEL noise dosimeter data files end in the extension dta.
5. This is the section from line 6 to line 12 where the user can enter details of the wearer of the CEL instrument. Information entered into the drop down dialog boxes shown when the OPTIONS|USER INFORMATION and are completed before the report is generated. If there is no information shown in these lines select the OPTIONS menu and fill in the relevant fields before selecting the VIEW|OSHA TEXT option.
6. This line will show the name of the Company entered in the OPTIONS|COMPANY NAME dialog box.
7. This line will show the name of the person that was wearing the instrument entered in the OPTIONS|USER INFORMATION dialog box.
8. This line will show the work location of the person that was wearing the instrument entered in the OPTIONS|USER INFORMATION dialog box.
9. This line will show the work Department of the person that was wearing the instrument entered in the OPTIONS|USER INFORMATION dialog box.
10. This line will show the job function of the person that was wearing the instrument entered in the OPTIONS|USER INFORMATION dialog box.
11. This line will show the payroll number of the person that was wearing the instrument entered in the OPTIONS|USER INFORMATION dialog box.
12. This line will show the social security number of the person that was wearing the instrument entered in the OPTIONS|USER INFORMATION dialog box.
13. This is the section from line 14 to line 15 where the user can enter details of any information that may be relevant to the tasks involving the wearer of the noise dosimeter while the run was being carried out. Enter here such details as the type of machines that were operating at the time or the different processes that were going on in order to understand the results later on when the data file is reviewed months or even years later.
14. This is the title for the user entered notes section.
15. This is a copy of any text that may have been added to the measurement results before the report was created. Free form text notes can be added to a run data file by selecting the VIEW|NOTES… option prior to selecting to view the OSHA TEXT report.
16. This section from line 17 to line 23 shows how the instrument was configured for the measurement run. This information is taken automatically from the CEL dosimeter without the user having to make any entry after the results have been downloaded to the software. Make sure that a serial number has been sent to the dosimeter prior to the run if you want to have that information associated with the data file. This can be

a useful feature where there is more than a single dosimeter being used at the same plant.

17. This line will show the name of the setup used to collect the run data. It will normally be one of the standard default configurations such as OSHA, DOD, ISO85, ISO90 or it may be a user-entered name of up to 5 characters set prior to the run starting.
18. This line shows the model designation of the CEL dosimeter used to collect the results.
19. This line shows the up to 6 digits entered by the user in the configuration file of the setup of the dosimeter prior to the start of the run.
20. This line shows the frequency weighting used for the measurement. Normally this will be the standard 'A' weighting since this is mandated for almost all noise in the workplace measurement protocols. It is also possible to select the 'C' weighting in a setup file sent to the instrument.
21. This line shows the frequency weighting for the separate peak detector used to measure any impulsiveness in the noise recording. This can be either Linear or 'C' as selected by the user prior to the run starting. It will be the Lin setting if the default OSHA setup has been used.
22. This is the time response selected for the run. For the default OSHA setup this will be the SLOW response but may also be the FAST or IMPULSE setting if selected prior to the run in a user defined setup.
23. This is the dynamic measurement range used for the measurement run. It will normally be the top range 70 to 140 dB but may also be the mid range 50 to 120 dB or the low range 30 to 100 dB depending on the setup used by the instrument. No measurements can be made below the bottom of the dynamic range so if there is likely to be a lot of time where the noise level is not too high it may be best to select the mid range. When measurements are to be made in anoisy area then the top range should be selected to make sure that the 140 dB overload level is not exceeded otherwise errors will be introduced into the calculation of the noise dose and any maximum noise levels recorded.
24. This section from line 25 to line 26 is where the information about the local acoustic calibration carried out prior to the run is displayed. It is recommended that the dosimeter is recalibrated at the end of the run to ensure the integrity of the measured data. The dosimeter and the field calibrator should be returned to an authorized CEL service center every 12 months to verify their full compliance with the published ANSI standards.
25. This line shows date and time the instrument last had its field calibration adjusted when using the approved calibrator such as the CEL-282 unit. The level of the calibration is not shown, only the date and time. This is normally carried out just before a run starts at the beginning of the day.
26. This line shows the unique serial number of the microphone assembly that was used with the instrument to collect the noise results. This is normally not important unless there are a number of dosimeters in use at the same plant when it provides a means of auditing the body/microphone combination used to make the measurements. If there is any doubt over the validity of either unit because of damage discovered after a sequence of measurements this information will help to establish the scale of any questionable results.

27. This section from line 29 to line 32 shows information about the actual recording times and any pauses that occurred during the run.
28. This line is the header line for the date and times.
29. This line shows the date and time of the start of the run to the nearest second.
30. This line shows the date and time of the end of the run to the nearest second.
31. This line shows the total length of time of the run to the nearest 1/100 of a second.
32. This line shows the total accumulated amount of time that the instrument was paused during the run. In the "paused" periods no noise levels are added into the dose stores and the elapsed time counter is paused to prevent any calculation errors for the average and any other noise levels. If the data logging function has been selected in the setup then the time history profiles will continue to be stored even when the instrument is paused using the keypad. This allows the user to see what occurred during the pause time of the run. The pause is available for use when the wearer of the dosimeter is not at work such as during a lunch break. In many situations the lower noise levels during the worker's rest period are not significant in comparison to the noise exposure received during the normal working day.

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33. Line 33 starts the beginning of the actual measured noise levels and begins at the top of the second page showing the results of the noise measurements from line 34 to line 46.
34. This line shows the average noise level using the lower OSHA threshold level setting of 80 dB with the Q = 5 dB exchange rate. The dB level shown here includes the entire noise equal to and above the 80 dB threshold and is called LOSHA1.
35. This line shows the average noise level using the upper OSHA threshold level setting of 90 dB with the Q = 5 dB exchange rate. The dB level shown here includes the entire noise equal to and above the 90 dB threshold and is called LOSHA2. This value may be significantly less that LOSHA1 depending on how much noise there was between 80 and 90 dB during the run. It may be the same as LOSHA1, which means that all of the measured noise levels during the run where considerably above 90 dB, but it can never be more than LOSHA1.
36. This line shows the equivalent continuous noise level, or Leq, measured for the whole of the run using a 3 dB exchange rate and including all of the noise with no threshold applied. It is the energy equivalent level as used by the European Noise Regulation for exposure to workplace noise.
37. This line shows the sound exposure level, or SEL (or LAE), that represents the total amount of noise energy measured as the Leq above in line 36 but expressed as if it had been accumulated in a standardized period of 1 second. It is related to the answer in line 36 by the following relationship; SEL = Leq + 10 log (duration in sec).
38. The information from line 38 to line 46 show the results based on the two threshold levels as described below. The left hand column shows the results including all noise levels equal to and greater than 80 dB; the right hand column shows the results including all the noise levels above 90 dB. The results in the right hand column are used for compliance purposes and the results in the left hand column are used for a hearing conservation program. Results in the right hand column will be either equal to or lower than the corresponding result in the left hand column. They can never be greater than those in the left column.

39. This line shows the criterion level in dB used as the reference point for the calculation of all noise dose percentage results.
40. This line shows the exchange rate, or doubling ratio, used for the calculation of the dB average results. For OSHA measurements this is always set to 5 dB.
41. This line shows the actual measured dose accumulated for the whole of the measurement run. It will be the shown as a percentage based on the criterion shown in line 39.
42. This line shows the 8 hour projected noise dose calculated from the actual measured dose according to the relationship; 8 hr Pdose = actual dose x 8/t where t is the actual measurement duration of the run in hours.
43. This line shows the actual measured average noise level with the threshold level applied. The result in the left column is the same as the LOSHA1 and the result in the right hand column is the same as the LOSHA2.
44. This is the calculated 8 hour time weighted average level, TWA, using the measured noise level shown in line 43 and normalizing it over the standard 8 hour day. Therefore, if the measurement duration was 1.5 hours the calculation will assume zero noise exposure for the other 6.5 hours and then average for the overall 8 hours. This will lead to the calculated TWA being lower than the measured Lavg if the measurement is less than 8 hours and greater if the measurement duration is longer than 8 hours.
45. This line shows the time value entered into the dialog box that appears when selecting the OPTIONS|VARIABLE RESULTS option. It is the value in the dialog box called the Projected period time and should be the real work duration of the individual that was monitored during the run. Enter in here the actual work shift duration in hours and minutes that represents the total time the individual is exposed to noise in the workplace.
46. This line shows the results of recalculating the noise dose results based on the period time entered by the user as described in line 45. If the time in line 45 is the actual shift duration of the worker then the dose values shown here are the required values as specified by OSHA and are normalized to the standard workday of 8 hours to allow for comparison with other industries in the USA. A result of 100% represents the allowable Permitted Exposure Level, PEL, according to CFR 1910.95 1983. This value may be expressed in decibel terms by use of the following formula to obtain the actual TWA result; TWA = 90 + 16.61 log (Pdose%/100%) dB.
47. Lines 48 to 56 will only appear if a user defined setup was used to collect the noise measurements and shows the settings chosen by the user. In the example shown here the results show the answers produced with the 3 dB exchange rate so that comparisons with the European method may be made with the American OSHA method.
48. This line corresponds to line 38 if present.
49. This line corresponds to line 39 if present.
50. This line corresponds to line 40 if present.
51. This line corresponds to line 41 if present.
52. This line corresponds to line 42 if present.
53. This line corresponds to line 43 if present.
54. This line corresponds to line 44 if present.

55. This line corresponds to line 45 if present.
56. This line corresponds to line 46 if present.
57. This section from line 48 (or 58) to line 58 (or 68) starts the section showing the amount of time the measured noise levels were greater than certain key values. Two columns of results are indicated; the first is the total amount of non-contiguous time the noted level was exceeded and the second column showing what proportion of the total measurement duration this represents. The purpose is to show the variability of the noise levels and what significance, if any, there may be for under or over range data.
58. This line shows the headings for the two columns. The left hand column is the total time to the nearest 1/100 second from the data samples collected and the right hand column is the percentage of the duration of the measurement resolved to 0.01%.
59. This line shows the amount of time the noise level was lower than the bottom of the dynamic range selected for the measurement. On the top range this will be less than 70 dB. On the mid range this will be less than 50 dB and on the low range this will be less than 30 dB.
60. This line shows the amount of time above the fixed 70 dB value. If the measurement was carried out on the top range then this time plus the time shown in the line above should add up to the total measurement duration time.
61. This line shows the amount of time above the fixed 85 dB value.
62. This line shows the amount of time above the fixed 90 dB value.
63. This line shows the amount of time above the fixed 100 dB value.
64. This line shows the amount of time above the fixed 115 dB value. If the measurement was made on the low range then this will show n.a. since it is above the 100 dB top of that dynamic range.
65. This line shows the amount of time above the fixed 140 dB value. If the measurement was made on the low or mid range then this will show n.a. since it is above the 100 or 120 dB top of those dynamic ranges.
66. This line shows the amount of time above the top of the selected measurement range whatever range was chosen for the run.
67. This line shows the results for the user-selected exceedance level as selected in line 68.
68. This line shows the value of the exceedance level in dB entered by the user in the OPTIONS|VARIABLE RESULTS dialog box. Values from 30 to 140 dB can be entered for this level either before or after the OSHA report is generated. To recalculate with a new exceedance level simply reselect the dialog box enter the new level and click on Save and apply to text to update the screen display. This dB value will be used the next time the software is used.
69. This section from line 59 (or 69) to line 48 (or 58) starts the section showing the highest noise levels reached during the measurement.
70. This line (or line 60) shows the headings for the columns of information with the date and time.
71. This line (or line 61) shows the maximum noise level sample with the selected time weighting (Slow for OSHA) and the ‘A’ frequency weighting to the nearest 1/100 second during the run.
72. This line (or line 62) shows the absolute peak noise level sample with no time

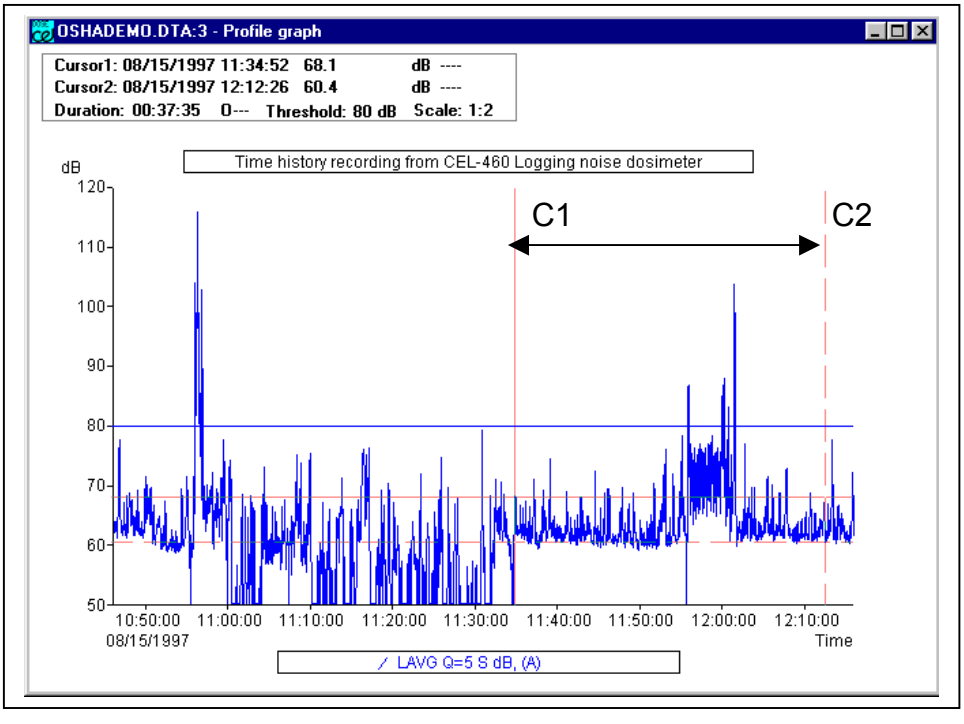
weighting and the 'Lin' frequency weighting (for OSHA) to the nearest 1/100 second during the run. This value will always be higher than the previous value because the peak response has a much shorter time constant than the Slow setting. This value can be up to 25 or even 30 dB higher than the rms maximum level depending on the impulsive nature of the noise during the run. The two times do not always occur at the same moment during the run.

73. This line (or line 63) starts the section from line 74 (or 64) to line 78 (or 68) that list the calculated statistical exceedance levels obtained from the samples stored in a CEL-460 dosimeter. This section will not be displayed for results obtained with a CEL-420 dosimeter since they are not saved in that instrument.
74. This line (or line 64) shows the first statistical parameter (usually the L10%) resolved to 0.5 dB. The percentile level shown here can be set to any value from 0.1 to 99.9% when setting up a configuration file prior to a measurement starting when using a CEL-460.
75. This line (or line 65) shows the second statistical parameter (usually the L50%) resolved to 0.5 dB. The percentile level shown here can be set to any value from 0.1 to 99.9% when setting up a configuration file prior to a measurement starting when using a CEL-460.
76. This line (or line 66) shows the third statistical parameter (usually the L90%) resolved to 0.5 dB. The percentile level shown here can be set to any value from 0.1 to 99.9% when setting up a configuration file prior to a measurement starting when using a CEL-460.
77. This line (or line 67) shows the fourth statistical parameter (usually the L95%) resolved to 0.5 dB. The percentile level shown here can be set to any value from 0.1 to 99.9% when setting up a configuration file prior to a measurement starting when using a CEL-460.
78. This line (or line 68) shows the fifth statistical parameter (usually the L99%) resolved to 0.5 dB. The percentile level shown here can be set to any value from 0.1 to 99.9% when setting up a configuration file prior to a measurement starting when using a CEL-460.
79. This line to the end of the report starts the section showing the time history profile information obtained from a CEL-460 logging instrument. Data logging is not available in the CEL-420 instrument so this section will not be shown in the report. The time history profile function must be enabled prior to a run beginning and the command sent to the dosimeter using the INSTRUMENT|CONTROL CEL-420/460 option in the software.
80. This line (or line 70) shows whether the profiles were enabled or disabled for the run. The profiles are part of the setup sent to the instrument as a configuration file before the run starts. They can be setup from the computer and then switched off or on from the keypad of the CEL-460 before beginning a run.
81. This line (or line 71) shows the selected sampling interval for the profile(s). It will be a value from 1 second as the shortest interval to 1 hour as the longest sampling interval. A value of 1 minute is a good compromise between obtaining enough data and not running out of memory to quickly. There is enough data storage in a CEL-460 for two parameters to be stored at 1-minute intervals for a full 8-hour measurement for all 16 runs. In fact there is enough memory to allow for all 16 runs

to last for 24 hours at 1 minute sampling of twp parameters altogether.

82. This line (or line 72) shows the first profile noise parameter selected for the run. Usually this will be the Lavg but can be specified by the user in the setup file.
83. This line (or line 73) shows the second profile noise parameter selected for the run. Usually this will be the Lmax or Leq but can be specified by the user in the setup file.

The benefit of sampling the time history profile information can be seen from the graph below where the Lavg values sampled in this case every 1 second can be recalculated using dB12 software and the two cursors shown as C1 and C2 to delineate a shorter interval during the total recording. An arbitrary threshold level, here shown at 80 dB, can be applied to the 1-second samples of the Lavg value.




The Readout box shown below allows the results of the recalculation to be seen when using the cursors positioned as described above.

The Lavg level is shown for the interval between the cursors as well as the TWA inside and outside the selected points on the graph allowing unwanted periods not represenatative of the noise exposure to be removed from the overall results. Results between the cursors can be zoomed to fill the whole screen to pick out the fine details of a measurement.