



CEL-6XO SERIES SOUND LEVEL METER

HB3340-01

OPERATOR'S MANUAL

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1. INTRODUCTION

The CEL-6X0 Sound Level Meter has been designed to meet the demands of worldwide industrial health and safety professionals as well as general noise measurement applications. The instrument encompasses functionality from basic sound level measurement to integrating and real-time octave band analysis.

The CEL-6X0 instrument is based on the very latest digital signal processing technology and has a crisp, vibrant colour TFT LCD display. This precision instrument is designed to bring your noise measurements up to date giving confident and reliable performance fully compliant with international standards.

Data is stored in a .csv format, compliant with MS Office applications, and through the USB connection, the .csv files can be copied to a PC without the need for any propriety software packages.

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2. INSTRUMENT FEATURES

The CEL-6X0 Sound Level Meter is available in two variants.

CEL-620A

An broadband integrating meter providing A, C, and Z frequency weightings, Fast Slow and Impulse time weightings with cumulative storage and PC connectivity functions. A single measurement range of 140dB RMS is standard. Simultaneous L_{Aeq} and L_{Ceq} values are measured for use in the HML selection of hearing protection method. L_{avg} is available with a selectable threshold. This model is available in Class 1 or Class 2 accuracy standards.

CEL-620B

The ultimate model providing 'Integrating' functionality combined with addition of Octave band analysis. This instrument is designed to satisfy the demands of all industrial noise at work applications. Octave results may be displayed graphically or in numerical form and can be A, C or Z frequency weighted. Advanced DSP processing provides fast parallel processing of Octave results from 16Hz to 16KHz. This model is available in Class 1 or Class 2.

DESCRIPTION (Refer to Figure 1)

The CEL-6X0 has a compact, ergonomic and robust 'rubber grip' case design that sits the instrument comfortably in the hand when not mounted on a tripod. The ½" microphone (1) can be removed from the fixed preamplifier (2). The windshleid (1) should be used to cover and protect the microphone at all times.

When the instrument is switched ON (3) it will run through its own software initialisation and then default to a Stop mode (Red Bar) screen.

To navigate within a screen use the Cursor Keys (6). Not all the screens have navigable fields on the display. To navigate from one screen to another, use the Soft Keys (5). To start a 'run' (measurement), press the Start key (7); to stop the run press the same key again.

The instrument has a single measurement range to 140dB (RMS) and 143.3dB (C) peak. No range adjustment is needed which greatly simplifies operation.

The CEL-6X0 can be 'explored' just like a USB memory device and the data files of the individual measurements are saved in a .CSV (Comma Separated Variable) format that is compatible with MS Office applications. This means that no software needs to be installed onto a PC to retrieve the data.

The CEL-6X0 measures all the required parameters simultaneously with the required frequency and time weighting.



1 – Windshield (covering removable microphone), 2 – Fixed Pre-amplifier,
3 – ON/OFF Key, 4 – Display, 5 – Soft Keys, 6 – Navigation Cursor Keys,
7 – Run/Stop Key.

Figure 1 CEL-6X0 Series

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BATTERY INSTALLATION (Refer to Figure 2)

CAUTION: The batteries can be zinc carbon, alkaline or rechargeable. Do not mix battery types.

The CEL-6X0 Instrument requires three AA batteries. Remove the battery compartment cover. Check correct polarity. Fit the batteries. Refit the battery cover. Press and release the **ON/OFF** Key. Check the battery condition symbol shows the battery has a good charge.

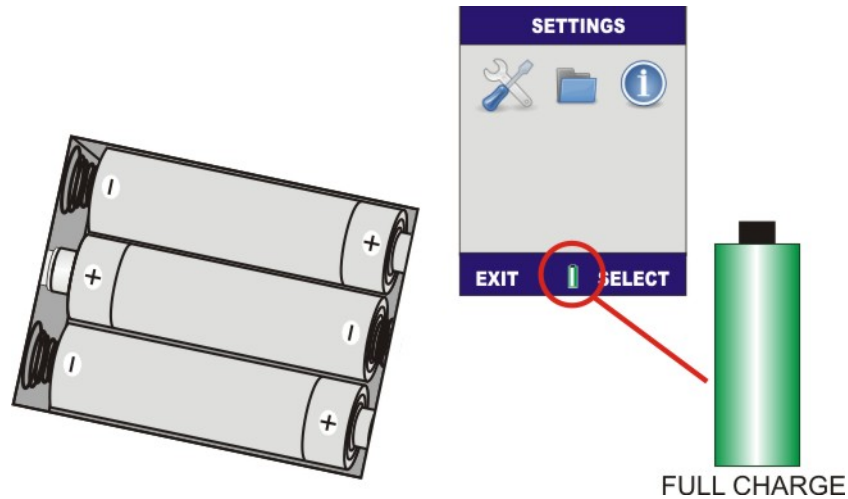


Figure 2 Battery Charge Indicator and Battery Installation.

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3. OPERATION

A. SWITCH ON the CEL-6X0 INSTRUMENT (Refer to Figure 3)

The instrument software screens have been designed with colour coded top and bottom bars to enable the user to know at a glance which part of the firmware (operating system) is currently being accessed.

Colour coding is as follows:

RED – Stop screens. These screens are displayed when the instrument has completed initialisation after power-up, as well as prior to taking a measurement run.

BLUE – Setting screens. These screens are used to set up the instrument correctly and includes settings such as date and time, language and backlight.

LIGHT BLUE – Memory Results screens. This is where the results from measurement runs are viewed.

GREEN – Run screens. These screens show a measurement run is in progress. Measured values are stored in the Memory Results.

YELLOW – Calibration screen. This screen is automatically displayed upon application of a 1KHz Acoustic Calibrator. This is where the instrument is calibrated prior to a run.

This is a precision instrument and should be calibrated before use to ensure accurate measurements.

CEL- 620A – When the instrument is powered up, the initialisation screen will be displayed first, followed by the Graph screen in the **STOP** mode (red bars). Press the MENU Key (A) to access the MENU screen.

CEL- 620B – When the instrument is powered up, the initialisation screen will be displayed first, followed by the Octave screen in the **STOP** mode (red bars). Press VIEW to see the Graph screen. Press the MENU Key (A) to access the MENU screen.

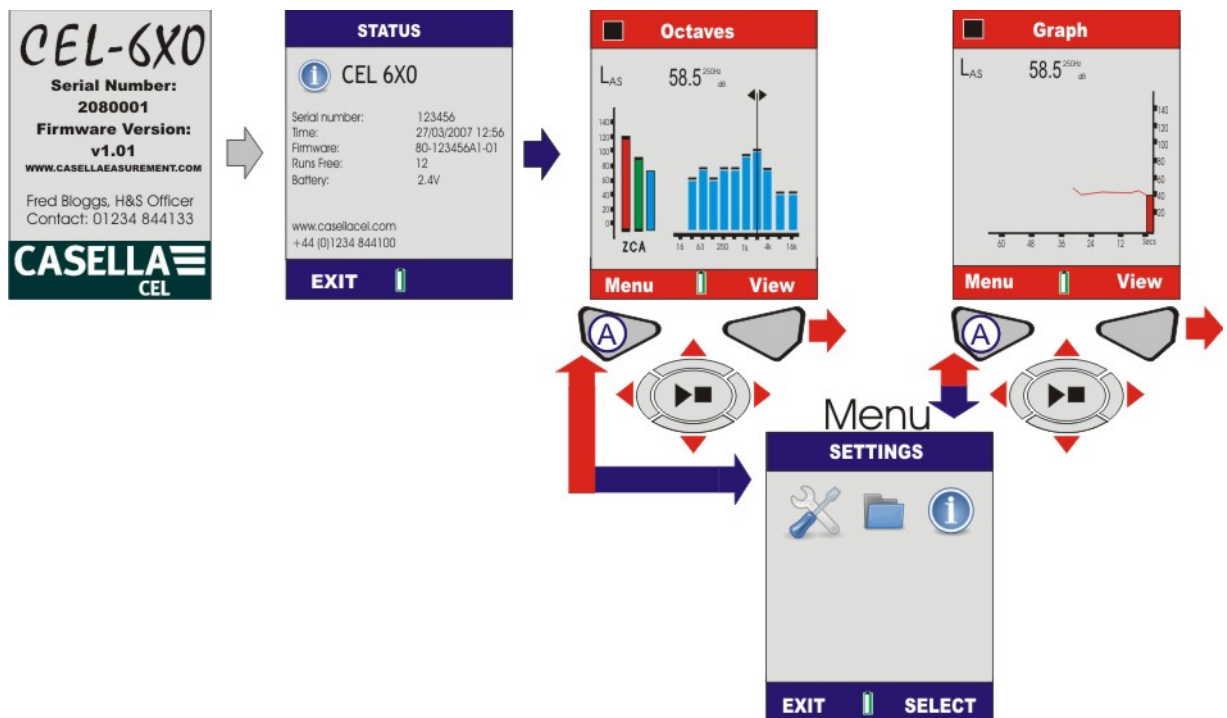


Figure 3 Switch ON the CEL-6X0

B. SETTINGS SCREENS (Refer to Figure 4)

Note: Press EXIT (A) at any time to go back to the previous screen.

SETTINGS

The Settings menu allows configuration of instrument 6X0 setup, time/date, language, backlight, run duration timer and calibration level.

Use Cursors (C) to select the Settings icon (1) and press Select (B).

6X0 SETUP

This menu allows selection of the parameters to be viewed during a measurement run. Note that regardless of the measurement view selected, all parameters will be stored simultaneously and can be viewed via a PC. Use cursors (C) to highlight 6X) SETUP icon and press (B).

MEASUREMENT VIEW.

Four predefined views are available to satisfy measurements for international workplace noise legislation. Use the cursor keys (C) to select the required view and press (B) to activate the measurement view. The Measurement View with the word ACTIVE next to it will be used for measurement runs. To view the details press View (B).

USER 1 AND 2 SETTINGS.

Two customisable views are available in which measurement weightings and parameters can be set. When one of these views is Active by pressing the (B) key, press (B) again to edit the view. Left right cursor keys are used to make changes and up/down cursor keys are used to move to the next field. On this screen you can define the following:

RESPONSE (Random/Freefield)

Random response is typically used to conform to US legislation for workplace noise whereas Freefield is used throughout the EU.

LAVG THRESHOLD (70-90dB)

The threshold is used for the calculation of L_{AVG} , which is the level at which all noise below is ignored. Note with threshold set to zero the threshold is off.

OCTAVE WEIGHTING (A, C or Z)

The frequency weighting used to display octave band results. Note that regardless of the settings selected, Z weighted measurements are stored so the data can be post processed on a PC to C or A weighting.

OCTAVE TIME CONST (F or S).

The time weighting used to display octave band results. Regardless of the selection, both time weightings are stored simultaneously for L_{MAX} results. Time weightings of Fast (F) or Slow (S) do not apply to L_{eq} measurements.

Press (D) to restore defaults. Press (B) to open the Functions screens for the selected 'User 1 View'.

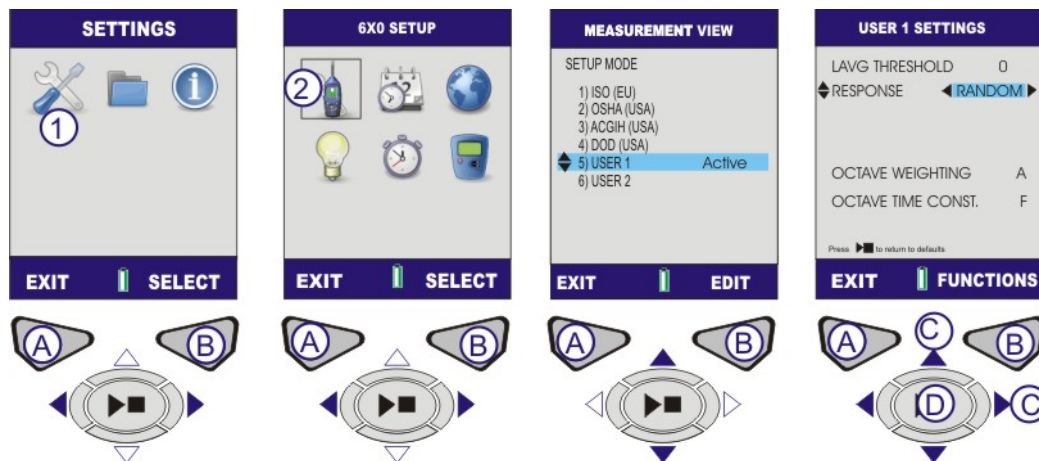


Figure 4 Setting Options (Sheet 1)

USER 1 AND 2 MEASUREMENT PARAMETERS

The Functions screens allow the Operator to select up to nine functions for the measurement 'run'. A counter replaces the battery level indicator at the foot of the screen. The counter displays the number of parameters selected.

Press the Functions key (B) and use the cursor keys (C) to navigate up/down/left/right.

The first screen shows Sound Pressure Level (SPL) and L_{eq} values. The parameters displayed during a measurement run are highlighted in green.

The Main SPL value is highlighted in red, which is the SPL value shown in Stop and Run modes. To select the Main value press and hold the Run/Stop key (D) until the parameter is highlighted in red.

Other parameters can be added. Navigate to the appropriate parameter that is to be added. A rectangle indicates the selected parameter. Press the Run/Stop key (D) to select the parameter. The parameter is highlighted green to show it is selected.

Repeat for any subsequent parameters that need to be selected and access the additional screen by pressing the More key (B). Press Back (A) to exit and any changes will be automatically saved.

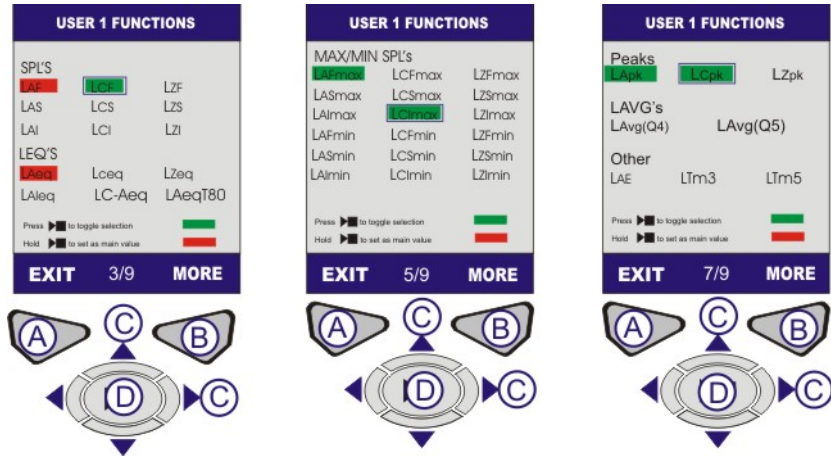


Figure 4 Settings Options (Sheet 2)

C. DATE AND TIME SCREENS (Refer to Figure 5)

SETTINGS 

From the Menu select the Settings icon (1) and press (B) to select.

SET CLOCK 

Use the cursors (C) to select the Set Clock icon and press (B) to select.

SET TIME

The screen will be displayed with the Time highlighted. To set the time press Edit (B). The hour will be highlighted. Adjust the hour setting use the Up/Down cursors. Press the cursor key (C) to highlight the minutes. Adjust the minutes setting use the Up/Down keys. Press the cursor key (C) to highlight to the seconds. Adjust the seconds setting use the Up/Down keys. When the correct time has been set, press Save (B).

SET DATE

Press Cursor Key (C) to move the highlight to the date. Press Edit (B) The day will be highlighted. Change the day setting use the Up/Down keys. Press the cursor key (C) to highlight the month. Adjust the month setting use the Up/Down keys. Press the cursor key (C) to highlight to the year. Change the year setting use the Up/Down keys. When the correct time has been set, press Save (B).

CLOCK SET. The time and date is now set. Press EXIT to go back to the Set Clock screen.

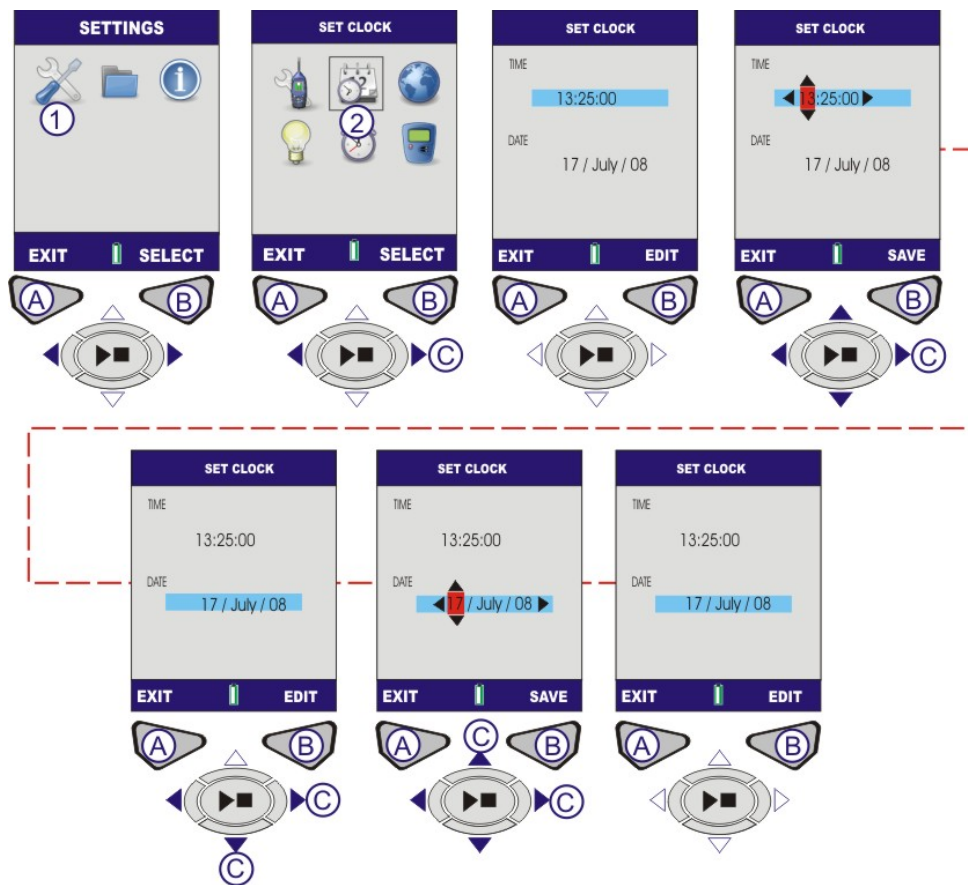


Figure 5 Set Date and Time

D. SET LANGUAGE (Refer to Figure 6)

LANGUAGE 

From the Menu select Settings (1). Use the cursor keys (C) to navigate to the World icon (2). Press Select (B).

Use cursors (C) to select the desired language and press (B) to select. Press Exit (A) when finished.

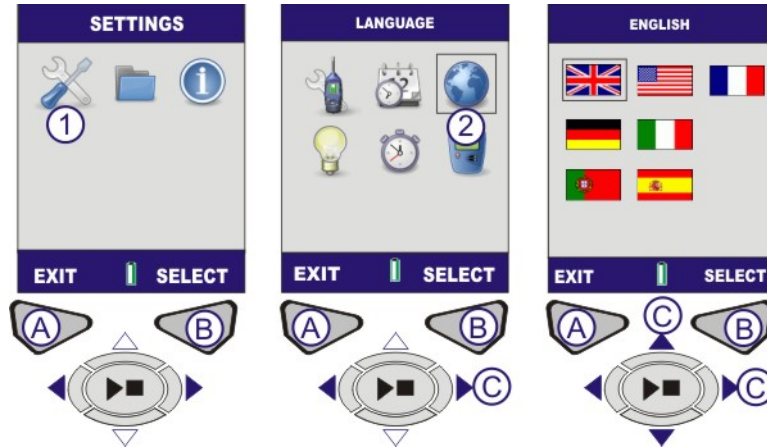


Figure 6 Set Language

E. SET BACKLIGHT (Refer to Figure 7)

BACKLIGHT 

From the Menu select Settings (1). Use the cursor keys (C) to navigate to the Backlight icon (2). Press Select (B).

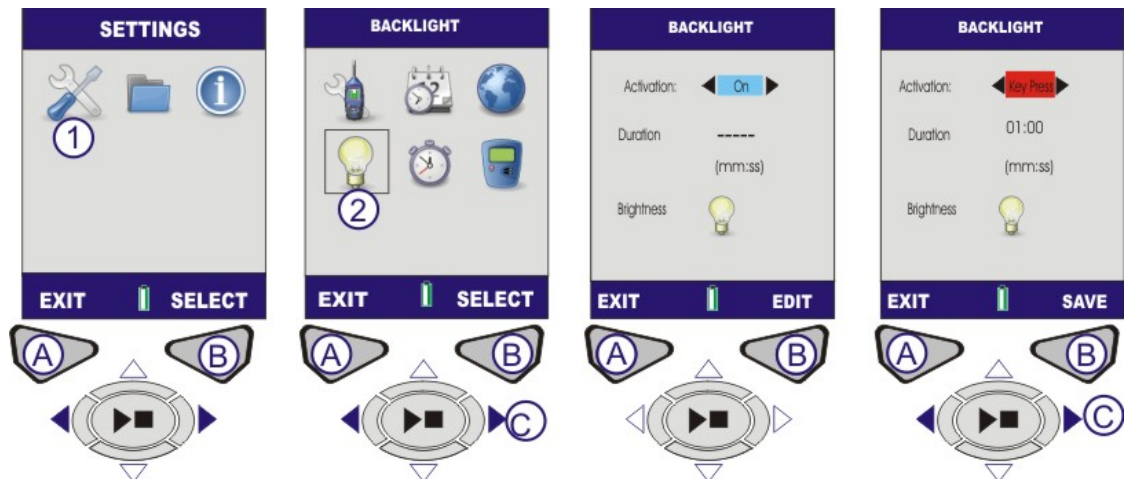


Figure 7 Set Backlight (Sheet 1)

ACTIVATION. The screen will be displayed with the Activation symbol highlighted. To set the Activation mode press Edit (B). Use the cursor keys (C) to toggle between the following backlight modes:

KEYPRESS- The backlight stays on for a set Duration following any key press.

ON- Backlight remains on continuously. If the ON option is selected the Duration setting will be disabled.

DURATION. If the Activation mode is set to Keypress, the duration the backlight remains on can be set. Press cursor key (C) to navigate to highlight Duration. To set the Duration press Edit (B). The Duration field will be highlighted with the Minutes enabled. To change the minutes use the Up/Down keys (C). Use cursor keys (C) to highlight the seconds. To change the seconds use the Up/Down cursors (C). When the Activation mode has been set, press Save (B).

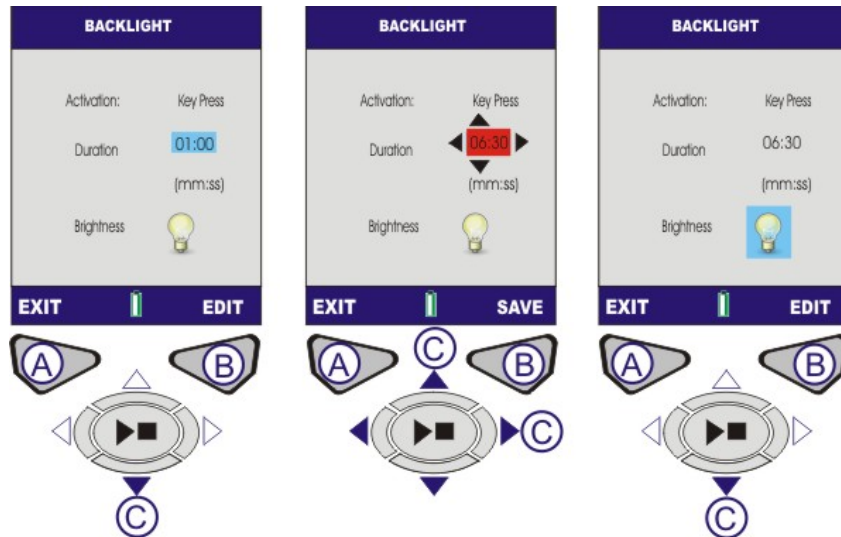


Figure 7 Set Backlight (Sheet 2)

BRIGHTNESS. The backlight brightness affects the battery life. For improved battery performance use the lowest brightness level suitable for your environment.

Press cursor key (C) to navigate to highlight Brightness. To set the Brightness press Edit (B). The Brightness symbol will be highlighted. To adjust the brightness use the cursor keys (C). When the Brightness mode has been set, press Save (B).

Press EXIT (A) to go back to the Settings screen.

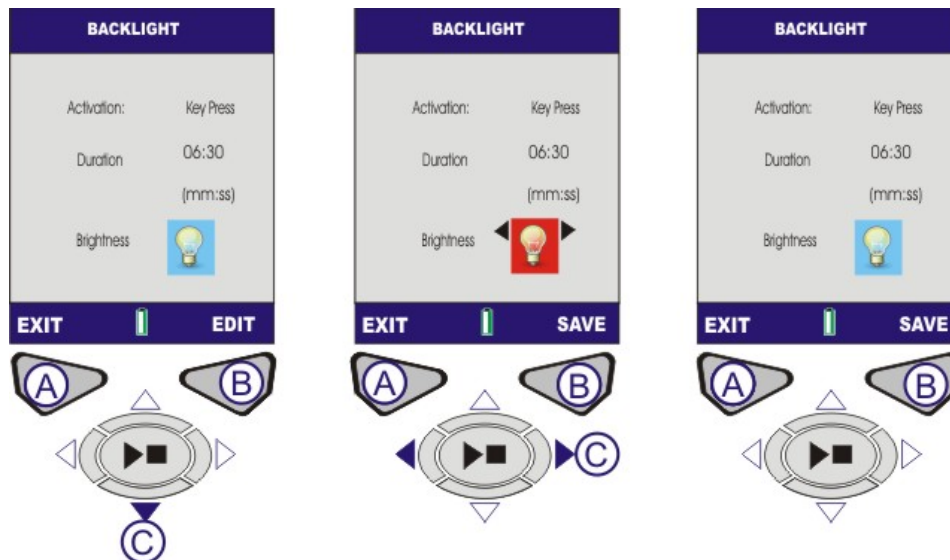


Figure 7 Set Backlight (Sheet 3)

F. SET RUN DURATION (Refer to Figure 8)

RUN DURATION 

The Duration timer allows measurements runs to be performed over a specified time. At the end of this time the measurement will automatically be stopped. From the Menu select Settings (1). Use the cursor keys (C) to navigate to the Run Duration icon (2). Press Select (B).

DURATION TIMER

Press (B) to edit the Duration timer to either On or Off and use cursors (C) to change the selection. Press Save (B) to continue.

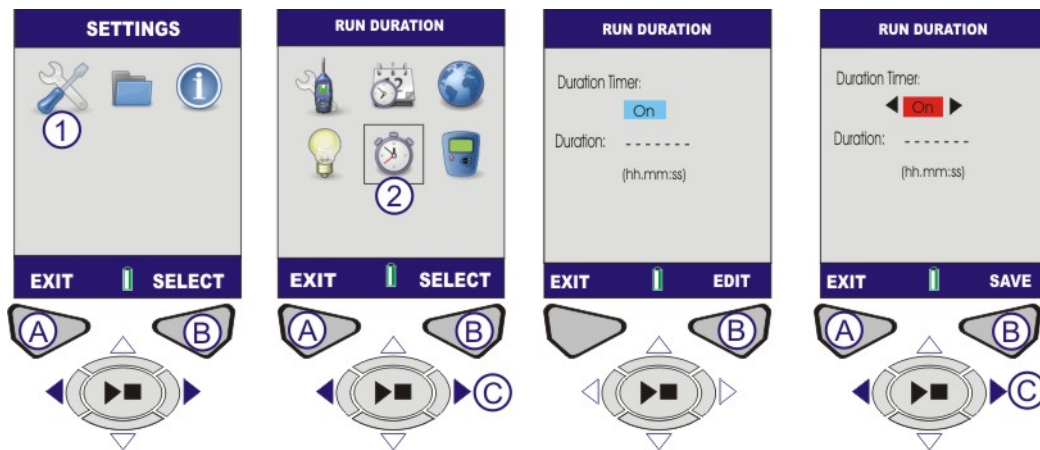


Figure 8 Run Duration (Sheet 1)

DURATION. Press cursor key (C) to navigate to the Duration field. Press Edit (B) to change the Duration time. Use the Up/Down cursors (C) to make changes as required.

Press Save (B) to save the changes. Press Exit (A) Settings screen.

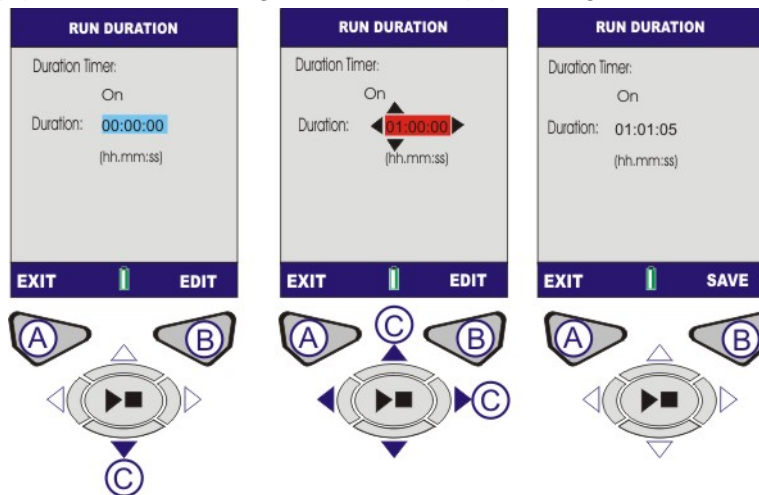


Figure 8 Run Duration (Sheet 2)

G. CAL. REF. LEVEL (Refer to Figure 9)

Note: For Instrument Calibration refer to Section J – Calibration Screens.

CAL. REF. LEVEL 

The Calibration Reference Level is used to set the instrument's calibration level to the exact level of your calibrator. Calibration levels can be set from 93-95dB or 113-115dB. A 1KHz calibrator must be used.

From the Menu select Settings (1), use the cursor keys (C) to navigate to the Cal. Ref Level icon (2). Press Select (B).

The Calibration Reference Level (Cal. Ref. Level) screen will open with the last level used for calibration. Press Edit (B) to alter the level.

The first digit can be selected 0 or 1 only, other digits can be 0-9. Use cursor keys (C) to make changes as required and press (B) to save changes.

Press Exit (A) to go back to the Settings screen.

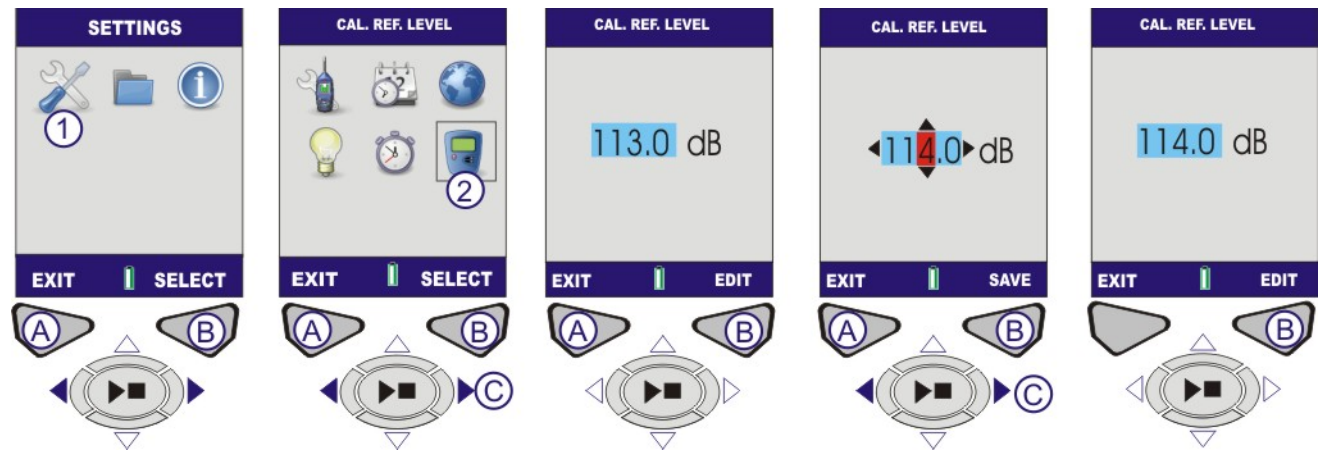


Figure 9 Calibration Reference Level

H. VIEW MEMORY RESULTS (Refer to Figure 10)

This is where the results from completed measurements are stored. The Memory Results are stored in a chronological order, with the latest measurement at the top of the list.

MEMORY RESULTS

From the Menu screen, use the cursor keys to select the Memory Results icon (1). Press Select (B) to access the memory.

Use the Up/Down cursors (C) to navigate the listed results. When a Memory Result has been selected, press Select (B) to access the measurement.

This screen gives the operator the choice to view the selected memory result, or to delete it. Use the left/right cursor keys (C) to select View and press Select (B).

The Results screen displays an overview of measurement data for the selected run. This is read only. To see the specific results, press View (B).

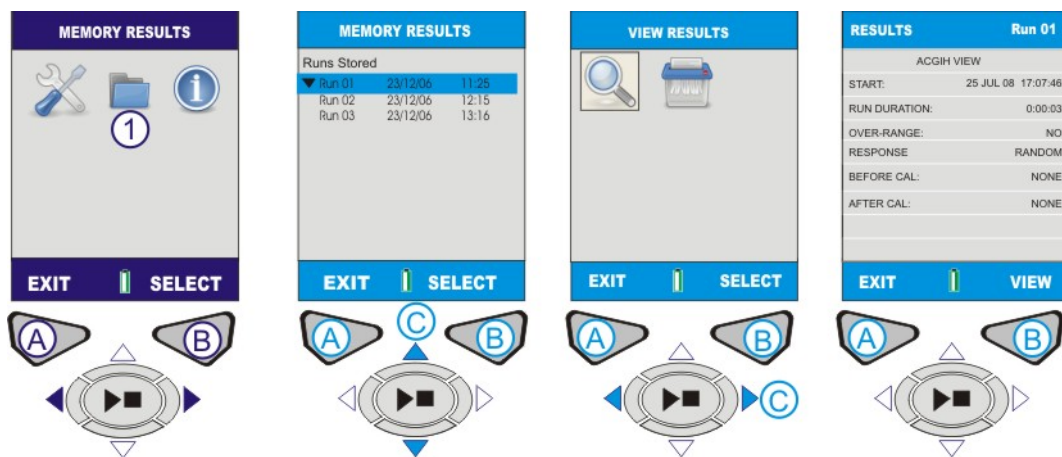


Figure 10 View Memory Results (Sheet 1)

The Octave values (CEL-620B only) saved in the memory Result are displayed in a graphical format. Use cursor keys (C) to move the cursor (1) across the graph. Each graph bar represents an octave band measured in Hz or KHz.

Use the up/down cursors keys (C) to toggle between parameters such as L_{MAX} and L_{AEQ} (2).

To view the numerical results (CEL-620B only), press View (B).

Press EXIT (A) to leave the Memory Results or VIEW (B) to cycle the Memory Results screens again.

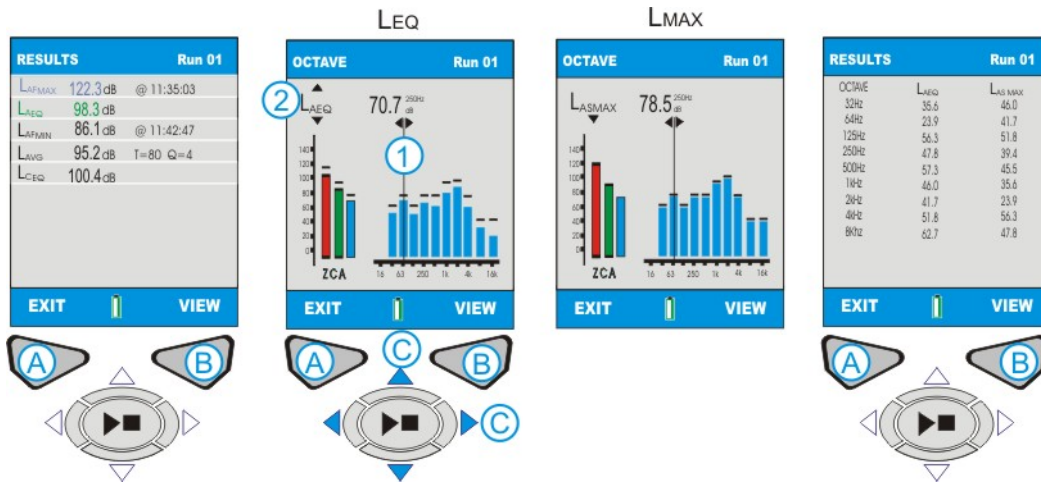


Figure 10 View Memory Results (Sheet 2)

I. DELETE MEMORY RESULTS (Refer to Figure 11)

From the chronological list of measurement runs, use the Up/Down cursors (C) to navigate the listed results. When a Memory Result has been selected, press Select (B) to go to the next screen.

This screen gives the operator the choice to view the selected memory result, or to delete it. Select Delete and press Select (B).

This screen asks the operator to either delete only the current run or to delete all the measurement runs within the memory. Use the cursors (C) to make the required selection and press (B) to Select. The next screen asks for final confirmation to permanently delete the Memory Result. Press (A) to confirm. The Memory Result will be permanently deleted. If not sure, press (B) to go back the Memory Results list.

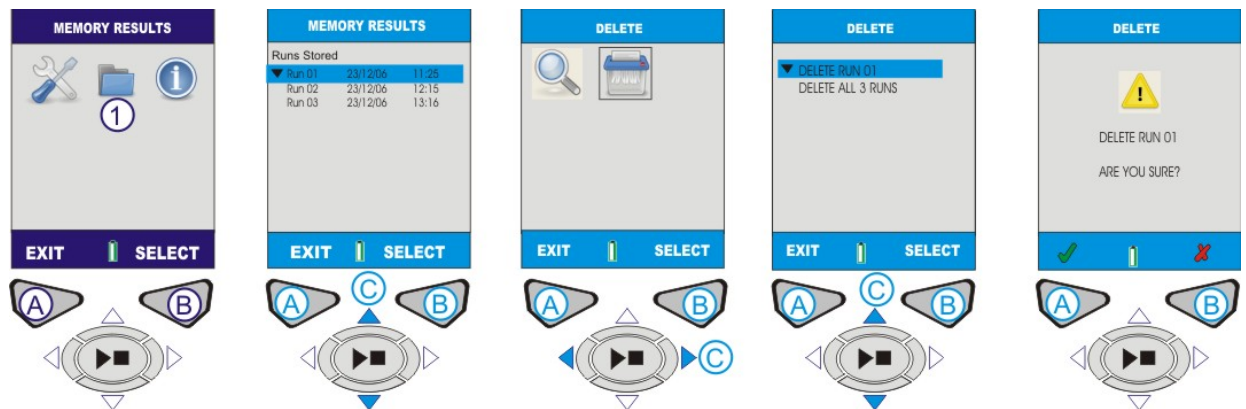


Figure 11 Delete Memory Result

J. RUN SCREENS (Refer to Figure 12)

The Instrument has four Run screens: The Main screen, the Graph screen, the Octaves screens and the Octaves Values screen, the last two of which are only available on the CEL-620B.

Switch **ON** the instrument as detailed in Figure 3.

CEL-620A – Press the **RUN/STOP** Key (D) to go to the Graph screen.

CEL-620B – OCTAVE screen. Press the **RUN/STOP** Key (D) to go to the Octaves screen.

CEL-620A and CEL-620B – The “Play” symbol is displayed in the top left hand corner of the screen. The “Pause” symbol is in the bottom left hand corner of the screen. The left hand Soft Key (A) is the PAUSE/RUN feature. When Pause is selected, ‘PAUSED!’ will be displayed on the screen. The incremental run number and duration are displayed in the top right hand corner of the screen. If the Run Duration Timer is set, a ‘stopwatch’ icon will appear next to the countdown timer. The Run Duration timer is enabled and disabled in SETTINGS (Refer to Figure 8). If the Run Duration is not set, the digital timer will count up until the run is stopped manually (by pressing D).

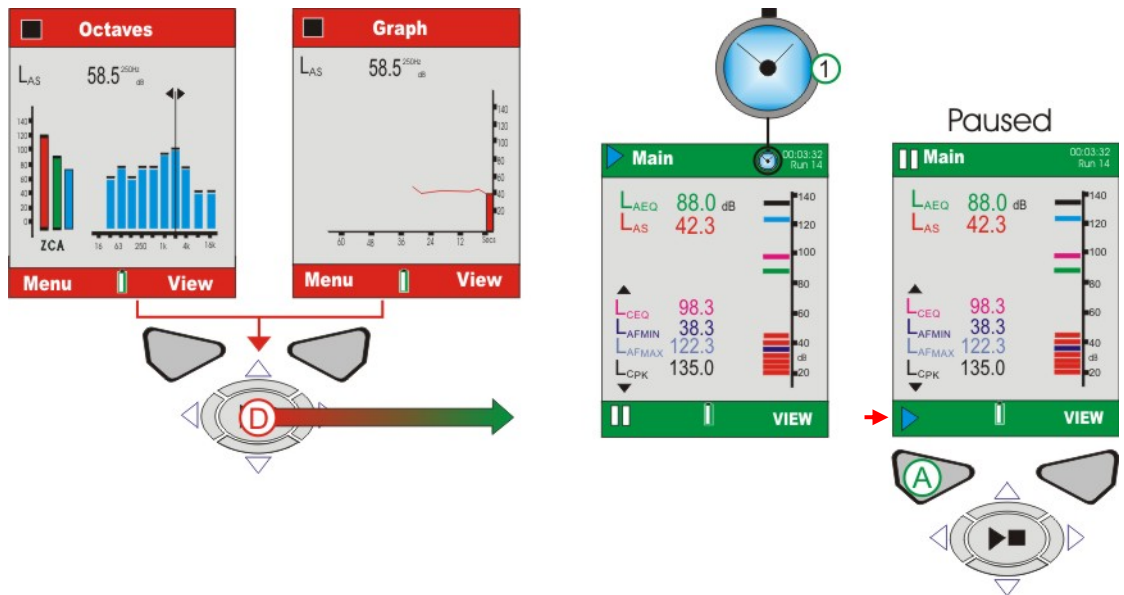


Figure 12 Run Screens

CEL-620A (Refer to Figure 13). The broadband values can be viewed as a bargraph on the Main screen, or as a graphical time history on the Graph screen. Pressing View key (B) toggles between Graph and Main screens.

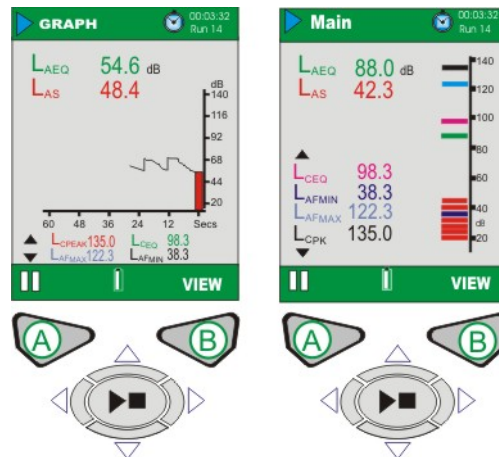


Figure 13 CEL-620A Run Screens

CEL-620B (Refer to Figure 14).

The CEL-620B provides two additional octave screens shown in Figure 14. Use the View key (B) to toggle the four available screens. Use the left/right cursor keys (C) to move across the frequency bands (1) when in graphical view. Use up/down cursor keys (C) to toggle between LMAX and LEQ parameters (2).

Each graph bar represents an octave band measured in Hz or KHz. To view a table of the octave values, press View (B).

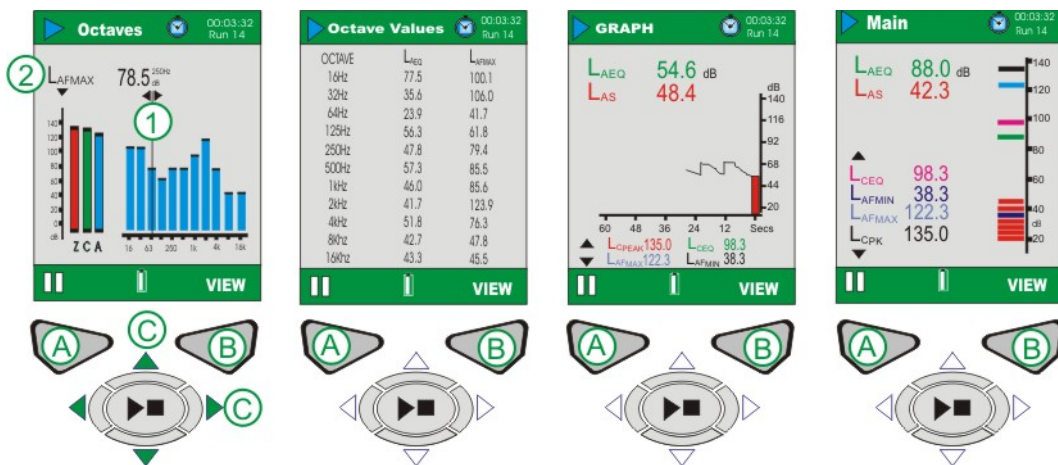


Figure 14 CEL-620B Main Run Screens

K. INSTRUMENT CALIBRATION (Refer to Figure 15)

Note: The Instrument must be at a STOP screen before the Acoustic Calibrator is fitted.

Calibrations should be performed before and after measurements. Fit the acoustic calibrator over the removable microphone and push it home. Switch the calibrator on using ON/OFF Key (1). The Instrument detects the signal and automatically activates the calibration screen (yellow bars). Press (B) to begin calibration. The instrument will be calibrated and the word PASSED displayed. A 'calibration change' value is shown at the bottom of the screen. This identifies the change since the previous calibration. Remove the acoustic calibrator. Press EXIT (A) to go back to the Stop screen. Press and hold the acoustic calibrator ON/OFF Key to switch the calibrator off.

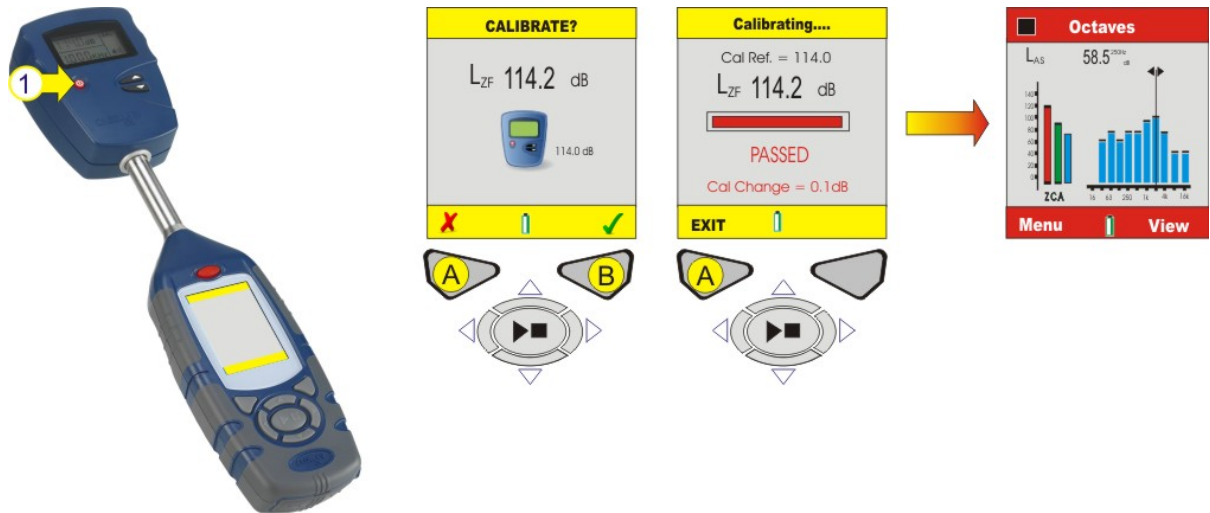


Figure 15 Instrument Calibration

I. EXTRACTING DATA (Refer to Figure 16)

Each measurement run is stored as a file within the CEL-620 in a .CSV format. This format will automatically open with MS EXCEL or similar office applications. The files are named consecutively from 1 to 100, so the first run will be named R001.CSV. All measurement parameters are contained within these files, regardless of the displayed parameters selected within the instrument setup.

The CEL-620 acts as a removable storage device when connected to a PC by the CMC51 cable. See Figure 18 below for the location of the USB connection on the CEL-620. Once connected, the PC will automatically detect the instrument is connected and within a few seconds have installed the necessary drivers. An Explorer window will open on the PC to show the files on the instrument. Simply copy the files to your PC as required.

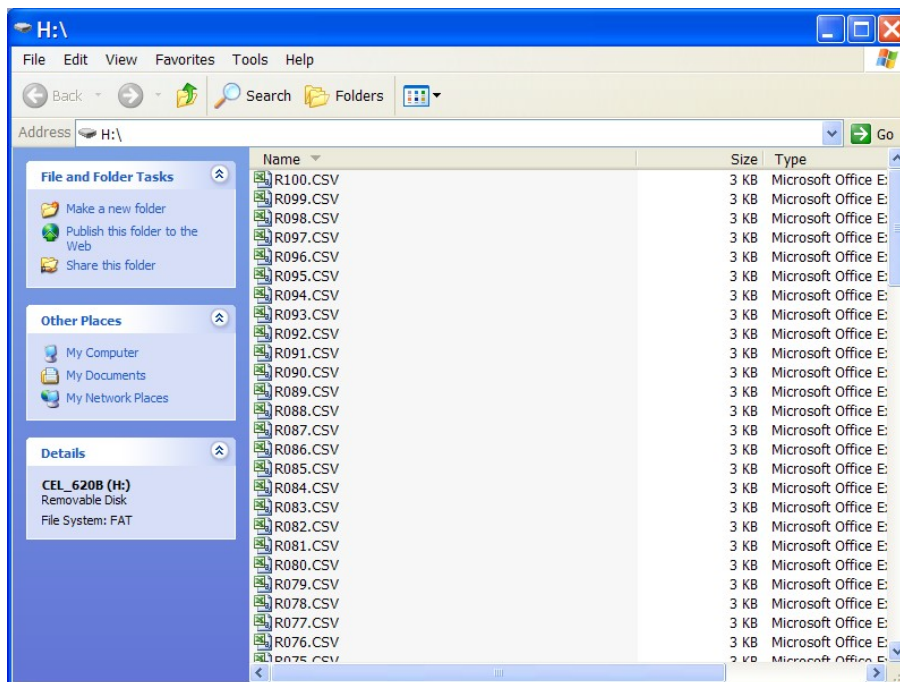


Figure 16 Measurement Data Files

J. SYSTEM TOOLS (Refer to Figure 17)

The system tools menu can be accessed from the startup screen by pressing the left/right cursor keys (C) together. Note that these functions need not be used within general operation and stored results will be lost if incorrectly used. Their primary function is for calibration laboratories or diagnostic purposes. Three options are available:

'Recover USB Disk Files' copies files stored in the backup E² memory to the USB disk.

'Set USB Disk R/W' allows the mass storage device to have data written to it. Note that this is primarily used for testing purposes.

'Format All Memory' will format the USB memory. **CAUTION:** All measurement data will be lost!

Use cursor keys (C) to highlight the required option and press (B) to select. When selected a final confirmation will be shown, press (A) to confirm or (B) to cancel. Once finished, press (A) to exit.

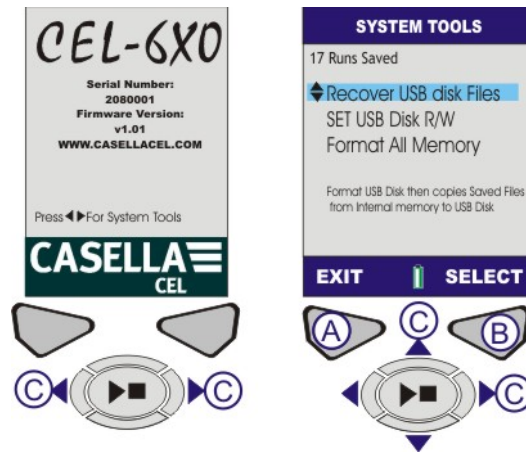


Figure 17 System Tools

4. STORAGE

Keep the Instrument and the associated equipment in its padded case at all times when not in use. Keep the Instrument dry, in a dust free environment, and away from heat generating and ozone generating sources. If the Instrument is not going to be used for a week or longer, remove the batteries from the battery compartments.

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5. SPECIFICATIONS

GENERAL

The CEL-6X0 provides SPL, Integrating and Octave band noise measurement compliant with the following international standards:-

IEC 61672-1 2002-5 (Electro-Acoustics – Sound Level Meters) Group 'X' instruments. Performance of Class 1 or 2 as relevant to instrument model.

IEC 60651: 1979, IEC 60804: 2000, ANSI S1.4: 1983, ANSI S1

Octave Filters comply with EN61260: 1996, Class 0 and ANSI S1.11 1986, Order-3 Type 0C.

MEASUREMENT RANGE

Single measurement range up to 140.2dB(A) RMS and 143.2dB (C) Peak. Linearity range from 10dB above noise floor.

RMS FREQUENCY WEIGHTINGS

A, C and Z filter weightings, satisfying IEC 61672-1: 2002 Class 1.

OCTAVE MEASUREMENT

Real-time 11 bands with centre frequencies from 16Hz to 16KHz. Displayed Spectrum may be pre-weighted with A, C or Z.

Z weighted octaves only are stored to be post weighted in dB36 software.

PEAK MEASUREMENT

A, C and Z weighted available to 143.3dB

RMS DETECTOR

Digitally derived True root-mean-square detection (RMS), 0.1dB display resolution.

NOISE FLOOR

Total inherent Noise including microphone thermal noise @20°C - <25dB(A) Class 1, <30(A) Class 2.

Electrical Noise floor < 20dB(A).

FREQUENCY RESPONSE

6Hz to 20KHz (upper and lower 3dB frequencies). Digital Sampling rate 67.2KHz

Overall Class 1 and 2 frequency response compliant with IEC 61672-1: (2002)

TIME WEIGHTINGS

Fast, Slow and Impulsive according to IEC 61672-1: (2002).

CORRECTION FILTERS

Built in correction filter for random incidence sound pressure fields.

REFERENCE CONDITIONS

23°C air temperature, 50% Relative Humidity,

101.325KPa atmospheric pressure.

Nominal reference level = 114.0dB at 1KHz

OPERATING ENVIRONMENTAL CONDITIONS

Humidity: 5 to 90%RH in the absence of condensation.

Temperature range: -10 to +50°C (Class 1), 0 to +40°C (Class 2)

Pressure: 65 to 108kPa

EFFECT OF TEMPERATURE

Electrical stability of instrument < ± 0.2 dB over the range -10 to +50°C

EFFECTS OF HUMIDITY

Less than ± 0.5 dB over the range 25 to 90% relative humidity (non-condensing), relative to the value at reference conditions.

STORAGE ENVIRONMENTAL CONDITIONS

Humidity: 0 to 90%RH in the absence of condensation.

Temperature: -20 to +60°C.

Pressure: 65 to 108kPa

MICROPHONE

Class 2: CEL-252 ½" Class 2, 30mV/Pa pre-polarised back electret.

Class 1: CEL-251 ½" Class 1, 50mV/Pa pre-polarised back electret.

Note: Instrument has fixed preamp so class is determined by microphone only.

CALIBRATION

Auto calibration by application of 1KHz calibrator, nominal level 114 or 94dB +/-1dB.

Auto calibrated to a user specified reference level with recording of date, time and offset.

POWER SUPPLY

External DC: 9 to 14V DC at typically 170mA. 2.1mm Power Connector.

Batteries: 3x AA Alkaline or rechargeable cells

Battery Life: Typically >8 hours in Broadband mode with backlight continuously on low intensity. High backlight setting will have a detrimental affect on battery life.

12 hours measuring with backlight off.

INTERNAL CLOCK:

Date and time accuracy better than 2 sec per day.

LANGUAGES:

English (default), Spanish, French, German, Italian, Portuguese, Chinese, and Brazilian Portuguese.

ELECTROMAGNETIC COMPATIBILITY

Instrumentation is designed and tested to comply with the following EMC and ESD Standards:

IEC 61000-4-2 Testing and Measuring Techniques - Electrostatic discharge immunity tests.

IEC 61000-4-3 Electromagnetic compatibility (EMC) - Radiated electromagnetic field tests.

IEC 61000-4-6 Electromagnetic compatibility (EMC) - Immunity to conducted disturbances induced by radio frequency fields. Tested at 10V/m or greater.

EFFECTS OF AC POWER FREQUENCY FIELDS

Less than ± 0.5 dB change from 74dBA 925Hz reference level when subjected to 160A/m AC magnetic field at 50 and 60Hz.

TRIPOD MOUNTING

Socket to mount on standard 1/4" (Whitworth) camera tripod thread.

DISPLAY

320x240 Transmissive Colour TFT

MEMORY

Micro SD 1GB Non-volatile internal.

CONNECTIVITY (Refer to Figure 18)

USB: Mini B to download to dB36 software or to explore via Windows Explorer to obtain .CSV file.

AC OUTPUT: Via 2.5mm stereo audio jack provided for DAT tape / PC wav file recording or headphone applications.

Approx 1V RMS full scale output corresponding to 104dB. Output impedance 1k Ω .



Figure 18 Connectivity

PHYSICAL CHARACTERISTICS

Dimensions: (WxHxD) 71.5x 230.0x 31.0mm for instrument including microphone and preamplifier.

Weight: <310g including batteries.

AVAILABLE PARAMETERS

CEL-620A

DISPLAYED FUNCTIONS			SLM RESPONSE						NOTES
Function	Format	Displayed Example	RMS Weight (w)			Time Weight (t)			
			Z	C	A	F	S	I	
SPL	L(wt)	L _{AF}	√	√	√	√	√	√	Measures single W and T weighting
SPLmax	L(wt)mx	L _{ZSMAX}	√	√	√	√	√	√	Lmx adopts frequency weighting as selected for SPL
SPLmin	L(wt)mn	L _{ZSMIN}	√	√	√	√	√	√	Lmn adopts frequency weighting as selected for SPL
L _{EQ} integrating	L _{WEQ}	L _{AEQ}	√	√	√	NA	NA	NA	SPL value changes to LEQ during a measurement run. (Simultaneous C&A)
L _{peak}	L(w)Pk	L _{CPK}	√	√	√	NA	NA	NA	A peak only available on user setups
LIEQ integrating	L(w)IEQ	L _{AEQ}	NA	NA	√	NA	NA	√	Impulsive L _{EQ} .
L _{AEQ} T80	L _{AEQ} T80	L _{AEQ} T80	NA	NA	√	NA	NA	NA	L _{AEQ} with Threshold and Q=3 (ACGIH)
L _{AE}	L(w)E	L _{AE}	NA	NA	√	NA	NA	NA	
L _{TM3}	LTM3	L _{TM3}	NA	NA	√	√	NA	NA	
L _{TM5}	LTM5	L _{TM5}	NA	NA	√	√	NA	NA	
*L _{AVG} integrating	L(w)AVG	L _{AVG}	NA	NA	√	NA	√	NA	L _{AVG} based on selectable threshold 70-90dB, Q5 or Q4 and Slow weighting.
HML	LC-LA	L _{C-LA}	NA	√	√	NA	NA	NA	L _{EQ} only, L _{avg} not required

Additional Octave Band Functions for CEL-620B

DISPLAYED FUNCTIONS			SLM RESPONSE						NOTES
Function	Format	Displayed Example	RMS Weight (w)			Time Weighting (t)			
			Z	C	A	F	S	I	
SPL	L(wt)	L _{AF}	√	√	√	√	√	NA	
SPLmax	L(wt)mx	L _{ZSMAX}	√	√	√	√	√	NA	Only Z weighting is saved
L _{EQ} integrating	L _{WEQ}	L _{AEQ}	√	√	√	NA	NA	NA	Only Z weighting is saved

DEFAULT SETUP MATRIX

SETUP	ISO	OSHA	DOD	ACGIH	USER 1	USER 2
Exchange Rate Threshold	3 0	5 80	4 80	3 80	3 0	5 90
Broadband Parameters	L _{AF}	L _{AS}	L _{AS}	L _{AS}	L _{AF}	L _{AS}
	L _{Aeq}	L _{avg}	L _{avg}	L _{Aeq} (T80)	L _{Aeq}	L _{avg}
	L _{Ceq}	L _{ASmax}	L _{ASmax}	L _{ASmax}	L _{Ceq}	L _{Ceq}
	L _{C-Aeq}	L _{Zpeak}	L _{Zpeak}	L _{Zpeak}	L _{C-Aeq}	L _{ASmax}
	L _{AFmax}	L _{C-Aeq}	L _{C-Aeq}	L _{C-Aeq}	L _{AFmax}	L _{Zpeak}
	L _{Cpeak}				L _{Cpeak}	L _{C-Aeq}
					L _{AFmin}	L _{ASmin}
Octaveband Parameters	L _{AF}	L _{AS}	L _{AS}	L _{AS}	L _{AF}	L _{AS}
	L _{Aeq}	L _{Aeq}	L _{Aeq}	L _{Aeq}	L _{Aeq}	L _{Aeq}
	L _{AFmax}	L _{ASmax}	L _{ASmax}	L _{ASmax}	L _{AFmax}	L _{ASmax}

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6. SERVICING AND WARRANTY ARRANGEMENTS

To ensure conformity with the specification, this instrument is thoroughly inspected and its accuracy verified prior to dispatch. All

technical information is filed under the instrument serial number, which should be quoted in any correspondence. The manufacturer undertakes to rectify any defect in the instrument directly attributable to faulty design or assembly and which becomes apparent during the warranty period. In order to take advantage of this warranty, the instrument must be returned, carriage paid, to the manufacturer's factory or accredited agent, where necessary repairs will be carried out.

The warranty period runs for 24 months from the date of receipt of goods, with exceptions on certain specialised components supplied by other manufacturers that may be warranted for shorter or longer periods by their actual manufacturers. In all such cases, the benefit of these undertakings will be passed on to the user. CASELLA CEL's liability is limited to items of their own manufacture, and they do not accept liability for any loss resulting from the operation or interpretation of the results from this equipment. To obtain repair under warranty, the instrument should be packed and returned in its original packing or an equivalent either to CASELLA CEL's local agent, or in the case of U.K. domestic sales, to the CASELLA CEL Service Department at Bedford. Please include the following information:

Instrument Type(s), Serial Number(s) and Firmware Version Number(s), Customer name and address, Contact name and phone number, details of any PC and Software involved, including Version Number(s), reason for returning the equipment with a detailed description of the fault and a list of any error messages that may have been displayed.

The necessary adjustments or repairs will be carried out, and the instrument returned as soon as possible. After the warranty has expired (except on approved accounts) service work is undertaken against quotations and all packing and transit costs are charged extra.

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7. APPENDIX

GLOSSARY OF TERMS

This Appendix gives a glossary of the acoustic terminology used in this manual. For further information, please contact Casella CEL or your local representative.

A, C and Z WEIGHTING (WEIGHTED)

A standard weighting of the audible frequencies designed to approximate the response of the human ear to noise.

ACOUSTIC CALIBRATOR

An instrument that provides a reference noise source with a standard level and frequency used to calibrate and check the performance of sound level meters and noise dosimeters.

Decibel (dB)

The standard physical unit for measuring sound level and noise exposure.

dB(A)

A-weighted sound level in decibels.

dB(C)

C-weighted sound level in decibels.

dB(Z)

Z-weighted sound level in decibels.

FAST TIME WEIGHTING

A standard time weighting applied by the sound level measurement instrument.

L_{AE}

The A-weighted exposure level is the level that would contain the same amount of energy in one second as the actual noise has during the whole measurement period.

L_{Aeq}

The A-weighted equivalent level is the level that would contain the same amount of noise energy as in the actual noise, effectively giving an average level over the measurement period. Following the ISO procedures, doubling the energy results in a 3dB change in the L_{eq} . This is denoted by exchange rate $Q=3$. For example, if the noise level in a factory was a constant 85dB and the measurement period was 4 hours, the L_{Aeq} would be 85dB(A). The calculation of L_{Aeq} does not use a threshold as in the calculation of LAVG, except for the LAEQ (T80) parameter defined for the ACGIH standard.

L_{AF}

The A-weighted sound level measured with Fast time weighting.

L_{AS}

The A-weighted sound level measured with Slow time weighting.

L_{ASmax}

The maximum A-weighted sound level measured with Slow time weighting.

L_{AVG}

This is a parameter used in OSHA measurements. It is the average sound level over the measurement period (equivalent to L_{eq}). Normally the term is used when the exchange rate Q is some value other than 3, such as for measurements used for the OSHA Hearing Conservation Amendment with $Q=5$. A Threshold value is used during the calculation of LAVG, where any levels below the threshold are not

included. For example, assume the threshold level is set to 80dB and the exchange rate is 5dB ($Q = 5$). If a one hour measurement was taken in an environment where the noise levels vary between 50 and 70dB, the sound level would never exceed the Threshold so the instrument would record no value for the LAVG. However, if the sound level exceeds the 80dB Threshold for only a few seconds, only these seconds will contribute to the LAVG, giving a level of around 40dB, which is much lower than the actual ambient sound levels in the measured environment.

 L_{Cpeak}

The peak C-weighted sound level.

 $L_{EP,d}$ ($L_{EX,8h}$)

This is the daily personal noise exposure defined by ISO 1999. It is the LAeq normalised to an 8 hour Criterion Time, i.e. a standard day. Assuming the noise level for the rest of the 8 hour reference period is “quiet”, the LEP,d will be: lower than the Leq when the measurement duration is less than 8 hours, equal to the Leq for a measurement of 8 hours, higher than the Leq for measurements longer than 8 hours. For example, if a noise measurement was made for 4 hours and the LAeq value was 90dB(A), the LEP,d value would be calculated to be 87dB(A) as the measurement duration is half the 8 hour Criterion Time and the exchange rate is 3 dB.

 L_{Ceq}

The C-weighted equivalent level is the level that would contain the same amount of noise energy as in the actual noise, effectively giving an average level over the measurement period. Following the ISO procedures, doubling the energy results in a 3dB change in the Leq. This is denoted by exchange rate $Q=3$.

PEAK

The maximum level in dB reached by the sound pressure at any instant during a measurement period. With the CEL-6X0, peak is measured with either C, Z or A weighting. It is the true peak level of the pressure wave, which should not be confused with the highest sound pressure level, termed Lmax.

SLOW TIME WEIGHTING

A standard time weighting applied by the noise measurement instrument.

SPL

The sound pressure level. This is the basic physical measure of noise, and is normally expressed in dB.

THRESHOLD

A threshold level below which sound is excluded from calculation. OSHA measurements use an 80 dB threshold.

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