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WARRANTY LIMITATION

Each EL-31X Environmental Noise Logger is supplied with microphone, communications cable, software and user manual. It carries a twelve months parts and labour warranty against manufacturing defects. If, during the warranty period, a unit fails to perform in accordance with the published specifications, it will be repaired or replaced free of charge. This warranty is void if the equipment has been dismantled, altered, abused in any way or if the operator has not followed user instructions. Authority to return the unit(s) must be obtained from **ARL** prior to shipment. The buyer will pay carriage costs to the point of purchase and those for return will be paid by **ARL**.

The above warranty does not include any implied warranty of functionality for a particular purpose. **ARL** assumes no responsibility for damages of any description resulting from the operation or use of its products. Since it is impossible to anticipate all of the conditions under which its products will be used, either by themselves or in conjunction with other products, **ARL** cannot accept responsibility for the results unless it has entered into a contract for services which clearly define such an extension of responsibility and liability.

ARL retains the right to change any specifications without notice as legislative, engineering or manufacturing conditions may warrant.

WARNING

This is a delicate electro-acoustic measuring instrument. Although it has been designed for field use, it contains sensitive electronic and electro-acoustic components which cannot reasonably be expected to withstand high levels of stress and shock. Evidence of negligence in the care and handling of the instrument may void the manufacturer's warranty.

1. Logger Hardware

1.1 Introduction

The EL-31x is designed to monitor noise levels unattended for periods of up to 2 weeks. It computes percentile noise statistics as well as the equivalent noise level for time intervals ranging from one minute to one hour. It can also record short-term L_{eq} data for intervals of 1, 2, 4, 8, 10, 20, 30 or 60 seconds. Data for up to 7940 time intervals can be stored in the logger's memory. The logger can also operate as a sound level meter. The current noise level is displayed on either the loggers Liquid Crystal Display or a connected PC using Windows based host software.

Normal configuration and control of the logger is achieved via the host software that will run on computers using a Microsoft Windows environment. Control of the logger can also be achieved using the front panel buttons and LCD.

The logger takes measurements that are in accordance with AS1259.1:1990 and AS1259.2:1992. The EL-315 is a Type 2 and the EL-316 is a Type 1.

A range of optional software utilities, accessories and spare parts are available for the EL-31x from your local representative or from Acoustic Research Laboratories Pty Ltd.

1.2 Logger Description

The EL-31x logger consists of the following components

- Case
- Base-plate
- Battery
- Electronics enclosure
- Microphone
- Cable and Preamp or Post (which includes Preamp).
- Host software
- Communications cable

1.2.1 The Case

The logger is housed in a rugged weatherproof case. To open the case, use your thumbs to lever up each of the two latches.

There are two configurations:



Configuration 1: The microphone connector is located on the right hand side of the case when viewed from the front. In this configuration the microphone is normally supplied as a 5-metre Microphone, Preamplifier and connector cable assembly. Inserting the plug and screwing it in until firm will connect it. A 1 metre (approximately) long rigid post is sometimes supplied with configuration 1. It screws into a plastic mount in the right hand top corner (as view from the front). The preamplifier and Microphone are secured at the top mount with a nylon screw.



Configuration 2: An assembled microphone, preamplifier, post and connector is supplied. The mounting connector is located, on top of a grey box, on the left hand side of the case as viewed from the front. The post microphone assembly is mounted by inserting it into the receptacle, screwing it in until firm.

At the front of the case is the pressure valve. This valve should be open when the logger is in transit and when the logger is in operation.

On the outside of each latch, a hole is provided to allow for security measures such as padlocks and chains.

1.2.2 The Base-plate

The base-plate fits neatly inside the base of the case and accommodates the battery and the electronics enclosure. Note that there is space on the right hand side of the 12-volt battery to accommodate a small tape recorder or a similar auxiliary device.

1.2.3 The Battery

The EL-31x uses a 24 Ampere-Hour battery. 24AH-12 Sealed Lead Acid.

As the battery accounts for a large share of the logger's mass, it is sometimes beneficial to remove the battery from the case for transportation. To do this, simply unscrew the terminal connectors from the battery, taking care not to short the battery +ve terminal to the logger metalwork.

When replacing the battery, ensure that the terminals are to the front of the unit and that the power leads are firmly screwed to the terminals.

The battery may be recharged while the logger is operating. Ensure that the safety instructions, supplied by the manufacturer of the battery charger, are followed. In particular:

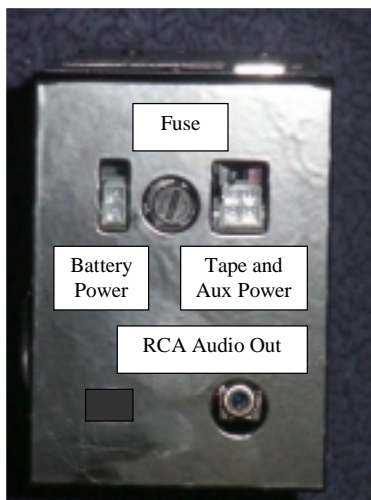
WARNING: Do not charge the battery in an airtight container. The lid of the logger should always be fully open during the charging process.

1.2.4 The Electronics Enclosure

This box holds the electronic circuitry that is used by the logger. The back of the enclosure contains the power connector and a fuse. In general there should be no need to access these ports. The top of the enclosure includes the user controls for the logger. The top consists of three push buttons "Wake-Up", "Select" and "Enter", an LCD and a nine pin D connector is provided for communications with the host software (computer), plus an LCD. Instructions on the use of the user controls may be found later in this manual (section 3).

Note: The electronic circuitry contains calibration settings and adjustments that are essential for the logger to operate correctly. Opening the enclosure will void this calibration. There are no user serviceable parts inside the enclosure.

1.2.5 The Connections



- **RCA Audio Signal Out** connector provides the microphone analogue output (amplified approximately 1.5 times) for input to Tape or Digital Audio Tape (DAT) Recorder.
- **Tape** is the power supply for an Analogue tape or DAT recorder. This is selectable in the Host software to 3V, 4.5V, 6V or 9V. It can supply 1A peak, with a continuous rating of 200mA.
- **Aux** is a general-purpose 12V supply that can be switched on or off by linking to the logging session using the parameters and settings window.
- **DAT Control** is an output to a Sony® Digital Audio Tape recorder, which provides a signal to Start and Stop the recording.
- **Battery**, +12V supply to the logger.

There is also a connector inside the enclosure, which can be wired, by Acoustic Research Laboratories, to provide a “Remote Trigger”. This can be used where a customer wants to trigger the recording of sound or logging of short term L_{eq} when they hear a noise of interest.

1.2.6 The Microphone

The EL-31x uses a Rion microphone attached to a NH-17 preamplifier. The microphone can be supplied with a type 1, UC53AH or Type 2, UC52AH. These are condenser type microphones. The logger must be configured for one of these options and microphones are not interchangeable without factory recalibration of the logger. These components comply with the specifications of AS1259 and as such are highly sensitive. While they have some resistance to environmental effects, care should be taken when the microphone is to be exposed to rain and other extremes in weather. Wind shields are required to be used at all times. Always ensure your windshield is in good condition before use.

1.2.7 The Host Software

This application runs on most computers using the Microsoft Windows operating environment. The software allows the user to interact with the logger in a graphical environment. All aspects of the loggers operation can be controlled via this software. For details on the operation of the host software see section 2.

1.2.8 The Communications Cable

This cable connects the logger to a PC. The standard cable has a 9-pin male D-connector at the logger end and a 9-pin female D-connector for the host PC. A 9-pin to 25-pin cable is available on request.

1.3 *Miscellaneous*

1.3.1 Year 2000 Compliance

The logger is year 2000 compliant.

1.3.2 EMC Compliance

All electrical appliances sold in Australia are required by law to comply with the Electromagnetic Compatibility (EMC) framework introduced by the Australian Communications Authority (ACA). In accordance with this framework, the EL-31x has been independently tested and found to conform to the Group 1, Class A requirements of AS/NZS 2064:1997. The EL-31x bears the C-Tick logo as required by the regulations.

AS/NZS 2064 is the standard that regulates the EMC emissions for Industrial, Scientific and Medical Equipment. Class A products are intended for commercial and industrial use. Whilst these products can be used in domestic situations, care should be exercised to ensure that the product does not interfere with other household equipment.

2. The Host Software

2.1 Introduction

The host software is the primary means of controlling the EL-31x. The use of the software can largely be learned through intuition as it uses many conventions used by the majority of Windows based packages. Key amongst these is the ability to easily access on-line help by pressing <F1>.

2.2 System Requirements

For the software to operate correctly, it is strongly recommended that the host PC meet the following minimum specifications:

- An IBM PC or compatible with an 80486 or better processor.
- Up to 5MByte of free hard disc space.
- At least one free serial communications port.
- A monitor with 640x480 resolution or better.
- Windows 95*/98/2000/NT.

Note: The host program uses many system files that are shared by other applications. Because of this the actual hard disc storage requirements will vary depending on the number of shared files already installed. Care should be taken when installing other Software that uses shared files. You may get messages such as "Installation has detected you have an older version of ..." "Do you want to replace the existing...?" We recommend that you keep your existing files.

* If you are using EL31x program with Windows 95, then the EL31x help file requires that you have updated to Internet Explorer 4 or greater or update your DCOM for Microsoft Windows® 95, version 1.2. Otherwise, the calls that you make to help only process an old version of help and some features will not be fully explained.

2.3 Installation

Insert the CD into your computer. Run the program "Setup.exe". Follow the instructions on the screen and the set-up program will automatically install the application.

2.4 Starting The Host Program

Ensure that the communications cable is plugged in to the logger as well as to your computer. To start the host program go through the Start Menu. Choose "Programs", then "ARL EL-31x Host Program".

The main window of the host program will appear. If all the settings are correct, you should be able to link to the logger by pressing the wake up button on the logger and clicking on the "Link" button located near the upper left corner of the window.

Note:

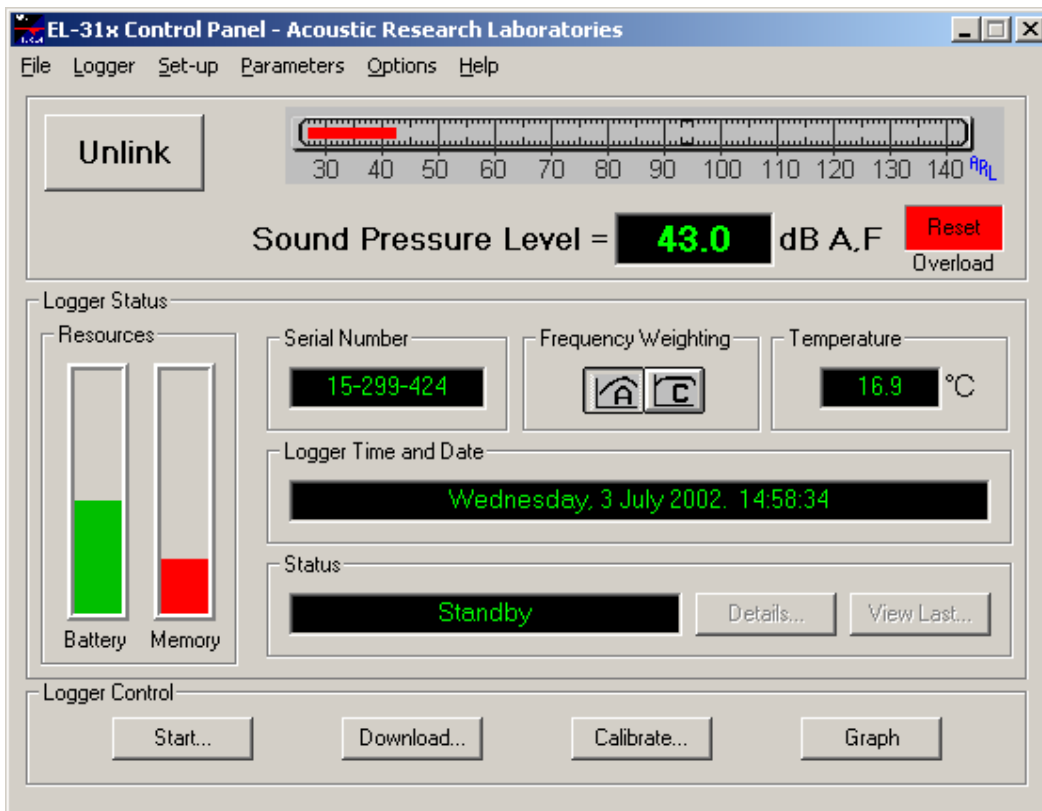
In order to link to a logger: -

- the cable must be connected to the computer and the logger,
- the correct serial port and baud rate (delivered at 19,200 baud) must be selected from the host program, and
- the logger must be "awake". If there are no messages on the logger's LCD, then press and hold the "wake-up" button until the logger responds.

Note that the host software parameters are stored from the last time the program was used. Hence once you have successfully linked to a logger there should be no need to re-configure the program in order to link.

2.5 The Main Window

Once communications with the logger are established, the main window should look similar to the figure below: -



The components of the main window are as follows: -

- 1) The **Link/Unlink** button. Use this button to establish or terminate communications with the logger. The button is context sensitive. That is if you are currently linked to the logger, the button will read "Unlink" whereas if you are not linked to the logger the button will read "Link"
- 2) **Sound Pressure Level** = box dB A, F. This gives the current sound pressure level A or C Weighted, as measured by the logger

- 3) **30 to 140** gauge. This gives the same information as Sound Pressure Level = box dB A, F in bar-graph form.
- 4) **Reset-Overload** button. When an overload has occurred this button turns red. If logging, this will automatically clear at the next statistical interval, or it can be cleared by clicking the button on the mouse. An over load will still be recorded in the statistical record
- 5) **Logger Control** buttons. These buttons provide short cuts to commonly accessed functions. The buttons are as follows: -
- **Start/Stop** – This is the same as the Start Logging/Stop Logging menu item.
 - **Download** – This is the same as the Download data menu item.
 - **Calibrate...** - This is the same as the system calibration menu item.
 - **Graph** – This button will launch the ARL Data Viewing Utility.
- 6) **Serial Number** panel. This panel gives the serial number of the logger to which you are linked.
- 7) **Frequency Weighting** buttons. These buttons indicate the current frequency weighting (A or C). If the logger is not logging, then clicking on these buttons will change the frequency weighting. If the logger is logging then the weighting cannot be changed.
- 8) **Status** panel. This panel indicates if the EL-31X is logging or is in standby mode.
- 9) **Details** button. Only active if logging. Clicking on this button will bring up a window that shows all of the details for the current logging session.
- 10) **View Last...** button. Only active if logging. Clicking on this button will bring up a window displaying the last set of results obtained during the logging session if the results are available. Results will only be displayed after one statistical period has elapsed.
- 11) **Logger Time and Date** Panel. This panel shows the current date and time as reported by the logger. If you are linked to the logger and the logger is in “Standby” mode, then you can double-click this panel to modify the date and/or time on the logger.
- 12) **Temperature** Panel. This panel will show the temperature inside the logger case.
- 13) The **Battery** Gauge. Displays relative battery level. Empty is approximately 10.8V.
- 14) The **Memory** Gauge. Displays the relative amount of memory that has been used.

Note: Some of the values are not updated real time. In order to update the memory, battery, temperature press F5 on computer keyboard. The main window also contains a set of menus (drop downs at the top) that allow the user to control all aspects of the logger. The menus are File, Logger, Set-up, Parameters, Options and Help. Their options are detailed below in sections 2.5.1 to 2.5.6.

2.5.1 The File Menu

Exit - This option will cause the program to terminate. If the system is linked to a logger, then it will automatically unlink itself from the logger.

2.5.2 The Logger Menu

Link To Logger / Unlink From Logger: This menu item will commence or end a session with a logger. The item is context sensitive. Thus when linked the item will unlink and when not linked the item will link to a logger.

Start Logging / Stop Logging - This option allows the user to commence or terminate a logging session. This option is context sensitive. Thus if the logger is in "standby" mode the logging window displays "Start Logging" option. If the logger is in "Logging" mode then the user is given the option to "Stop Logging". By selecting this option, the user is asked to confirm. If user response is yes, the EL-31X will stop logging. The user will be given an opportunity to take a post-measurement reference.

Download Data - This option will bring up the Download Data window. From here the user can browse through buffers in the logger's memory, download any buffers and erase buffers.

2.5.3 The Set-Up Menu

System Calibration - This will bring up the system calibration dialogue. Through this dialogue the Sound Pressure level accuracy of the logger can be adjusted to match an acoustic calibrator's output.

Temperature Calibration - This will bring up the temperature calibration dialogue. Through this dialogue the temperature sensor calibration offset can be adjusted. Note that the temperature gauge is provided as an indication only. The temperature sensor is mounted inside the PCB enclosure. It has an accuracy of $\pm 2^{\circ}\text{C}$.

Set Time and Date - This option will bring up a dialogue that allows the setting of the clock on the logger.

Note: When the host software links to a logger, direct front panel operation is disabled. However, when the host software unlinks then control returns to the front panel.

Reset Logger - This command will reset the logger. It is not necessary to be linked to the logger, however ensure that the communications cable is connected to a logger and that the logger is awake. When the logger is reset the logger is altered in the following ways: -

- All data in memory is erased.
- The logger is returned to "standby" mode.
- The calibration settings for the temperature sensor and the acoustic reference are returned to their default values.
- If the system is linked to the logger, then the system will automatically unlink itself.

Dump All – This will download the entire memory into a number of files on the host PC. This will give you the Save As dialogue box. See section 2.11.1 for the file format generated. To carry out the dump all function it will take 4 minutes (approximately) at 19,200 baud.

2.5.4 The Parameters Menu

Communications Port - This item brings up a sub-menu listing available serial ports. The port that is currently selected is denoted by a check mark next to the port. To select a port, simply click on the appropriate port in the sub-menu. Note that this option is disabled when the system is already linked to the logger.

Baud Rate - This item brings up a sub-menu listing available baud rates. The baud rate that is currently selected is denoted by a check mark next to the number. To select a baud rate, simply click on the appropriate number in the sub-menu. The default value is 19200. 9600 is normally used if connected via **GSM**.

Communication Method – Either Modem or direct. If selecting Modem then when the connect button is pressed another window pops up asking for an initialisation string and phone number.

The initialisation string is normally left blank, however some modems may need some initialisation. Refer to your modem instruction. Refer to the GSM section near the end of the manual. Landline modem set-up is similar to GSM except they can be run at 19200 baud.

The phone number is remembered and will become part of a list if you have several remote loggers. If you are dialling through a PABX a pause can be created by inserting commas “,” in the number. Each comma is approx 2 seconds.

Frequency Weighting - This item brings up a sub-menu listing available frequency weighting filters (A or C). The weighting that is currently selected is denoted by a check mark next to the weighting. To select a frequency weighting, simply click on the appropriate weighting in the sub-menu. Note that this option is disabled when the system is not linked to a logger.

2.5.5 The Options Menu

LCD Update Rate - This item brings up a sub-menu listing available display update rates of (1, 2, 4 or 8 updates per second). The rate that is currently selected is denoted by a check mark next to the rate. To select a particular update rate, simply click on the appropriate rate in the sub-menu.

Maximum Hold - When this item is enabled, the host program will enter maximum hold mode. A "Reset Max Hold" button will appear below the SPL Display and a check mark will appear next to the menu item. The SPL Display and gauge will indicate the highest SPL reading taken from the logger since the maximum hold was reset. Pressing the "Reset Max Hold" button will reset the maximum value. Selecting "Maximum Hold" again from the menu will disable maximum hold mode. The "Reset Max Hold" button will disappear and the Displayed SPL will be the current SPL according to the logger.

Note: The maximum hold mode is not a peak detector as defined in AS1259.1 (1990). It is a simple software utility that can record the highest time-averaged value read.

Confirmation - Selecting this option will bring up the Confirmation window. From here the user can select events where they wish to be notified or asked for confirmation.

2.5.6 The Help Menu

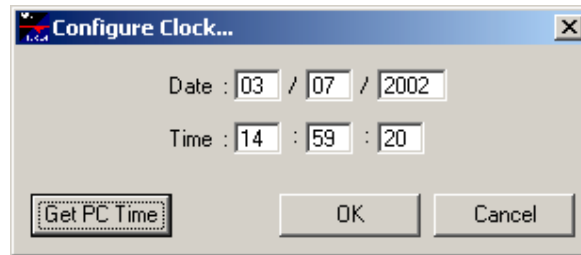
Contents – This will bring up a list of windows for which help is available. Note that the help system is context sensitive. Thus by pressing <F1> the user will get help on the current window.

About - This will bring up a window with some information about the logger and Acoustic Research Laboratories.

If linked to the logger this will also show firmware revisions. Some features in the software are enabled or disabled depending on these revision numbers. In this way the Host Software is usually compatible with older 31X loggers.

2.6 The Date/Time Window

This window allows the user to change the date and/or time on the loggers' clock. The Date/Time Window is illustrated in the figure below: -



The key features are: -

- 1) The **"Get PC Time"** button - This button sets all the data fields in the window to the date and time according to the computer.
- 2) The **"Cancel"** button - Click this to remove the window, disregarding any changes made.
- 3) The **"OK"** button - Click this button to remove the window, sending the changes to the logger.
- 4) The Data Blocks- These Blocks contain the date and time. To modify any element, the user can click on the element and type the new value.

Note that system does some basic error checking on the entered values to ensure correct data entry.

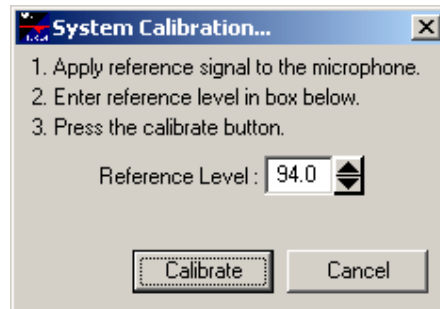
Notes on the date and time: -

- The year may be any value between 1996 and 2250.

- Leap years are accounted for.

2.7 The System Calibration Window

This window allows the user to adjust the sensitivity of the logger. The window is illustrated below: -



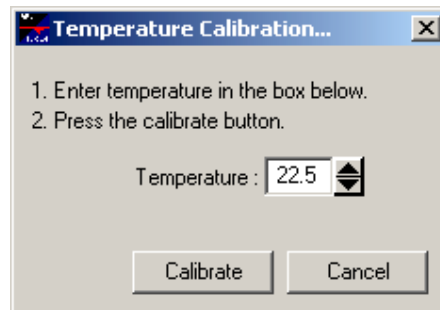
The key features of the window are: -

- 1) On screen **instructions** - These simple steps will guide the user through the calibration process.
- 2) **Reference Level** Box- Set this box to the level of the calibrator in use. The value in the box can be changed by either entering the value directly or by using the increment/decrement buttons next to the **Reference Level**.
- 3) **Calibrate** Button - This button will adjust the logger's sound pressure level accuracy to match the requested level.
- 4) **Cancel** Button - This button will cancel the calibration function and return the user to the main window.

Note that the system calibration will only modify the sound pressure level accuracy of the EL-31X to match the current operating conditions. It is not a substitute for the regular calibrations that should be carried out by your authorised Acoustic Research Laboratories representative.

2.8 The Temperature Calibration Window

From this window the user can adjust the temperature sensor on the logger. The temperature calibration window is illustrated below.



1). The On-screen Instructions. These messages are provided as simple prompts to guide the user through the temperature calibration operation.

2). The Reference Temperature field. Text entered into this field is used as the new reference temperature.

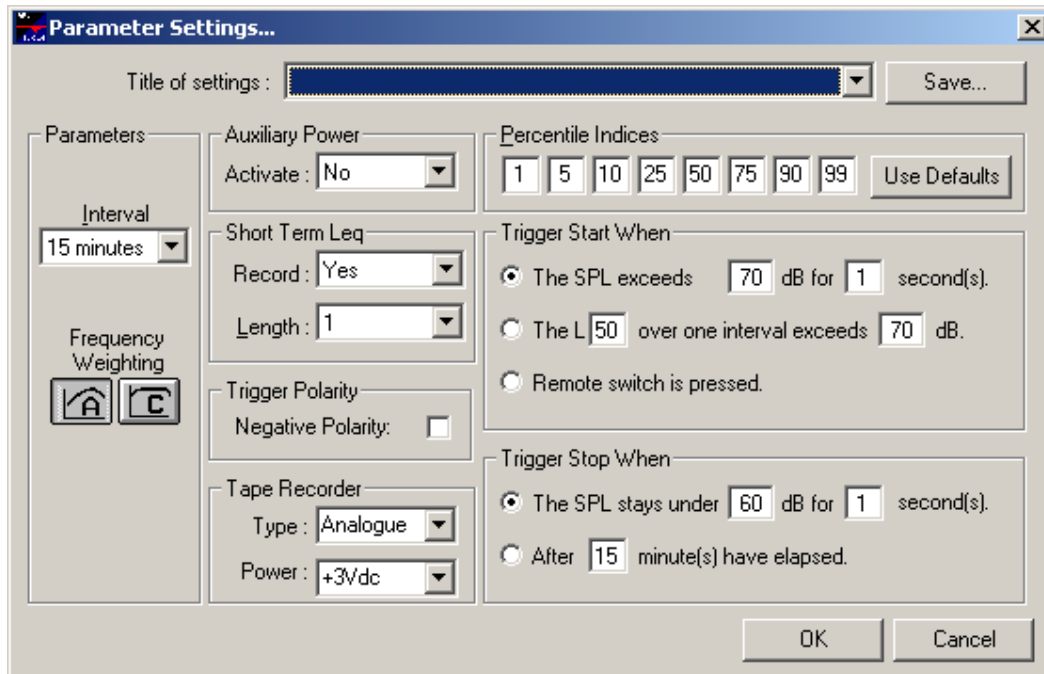
Note that the level should be current ambient temperature.

3). The Calibrate button. Click this button to accept the current temperature and perform the temperature sensor calibration. Once the operation is complete, control will return to the main window.

4). The Cancel button. Click this button to return to the main window without changing any of the logger's settings.

2.9 The Parameter Settings Window

This window may be used to configure a logging session. Up to 4 sets of parameters may be stored. Note that these set-ups are stored on the host computer and not in the logger. The Parameter and Settings Window is illustrated below: -



The key features of the Parameter Settings Window are: -

1) The **Title of Settings** contains stored set-ups. When a stored set up is selected, all other information boxes are set according to the stored information. When other information boxes are entered or altered, the **Title of Settings** box goes blank to indicate that the settings are not one of the stored ones.

2) The **Save...** Button – Click on this button to save the current set-up as a name set-up. A window will be displayed allowing the user to enter the title of the set-up and which slot they are to be saved to. Up to four sets of parameters may be stored at any one time on the system.

3) **Parameters Area** – This is where the parameters for the logging are set. The following parameters can be set: -

- **Statistical Interval** – The period of logging that is processed for each data set. Select the interval from the pull-down list.
- **Frequency Weighting** – Press the appropriate button to select the required frequency weighting.

4) The **Auxiliary Power** area – The conditions for the activation of the auxiliary power supply is selected from this list. The auxiliary power supply is a +12Vdc power supply provided out of the auxiliary port at the rear of the PCB enclosure. Possible options are: -

- **No** – The auxiliary power is always off.

- **Yes** – The auxiliary power is on whenever the logger is logging.
- **On trigger** – The auxiliary power is switched on when a start trigger condition is encountered during a logging session. Auxiliary power is shut off when the stop trigger condition is encountered or when logging ceases, whichever occurs first.

5) **Short Term L_{eq} Options** – The options in this area allow for the recording of short term L_{EQ} data. The data is stored in a separate data file with the extension “filename_leq.csv”. The two lists are: -

- **Record** – This list controls when short-term L_{EQ} data is to be recorded. The options are Yes/No/On trigger as for the auxiliary power control.
- **Length** – Select the length of each short term L_{eq} from this list. This list is disabled if there is to be no recording.

Available L_{eq} lengths are 1,2,4,8,10,20,30,60 seconds.

6) **Tape Recorder Options Area** – This area allows for the use of an analogue tape recorder or a DAT recorder.

- **Type** – Selects the type of recorder to use. Select “None” to disable this feature. Select “Analogue” or “DAT” depending on the requirements. Note that the appropriate interface cable is required. These cables can be purchased from your Acoustic Research Laboratories distributor.
- **Power** – Selects the power supply voltage to be provided to the tape recorder. Ensure that this setting is correct.

Caution: Permanent damage can occur to the recorder if an incorrect voltage is supplied.

7) **Percentile Indices area** – This is where the parameters for the statistical calculations are set.

- **Use Defaults Indices Button** – Click on this button to reset the percentile indices.
- **Data Fields** – eight percentile numbers can be entered into these fields.

8) **Start Trigger Area** – These options determine when the trigger is set. The trigger can be used to control short-term L_{eq} recording, the tape recorder or the auxiliary power supply. The available trigger options are: -

- **Trigger start on noise level** – Ensure that the appropriate level and the trigger duration is entered in the box provided.
- **Trigger start on percentile indices** – Ensure that the noise level and the percentile index are entered. Note that the percentile index does not have to match the levels used for the stored statistical data. Note also that the trigger will not occur until the end of a statistical interval.

9) **Stop Trigger Area** – These options determine when the trigger is reset. The available stop trigger options are: -

- **Trigger stop on noise level** – Ensure that the required noise level and the trigger duration is entered.
- **Trigger stop on time delay** – Enter the time delay in minutes.

- **Remote Tape Recorder Switch** – If the remote trigger switch is fitted, this can be used to start the Tape recorder and/or the Short term L_{eq} .

10) **Trigger Polarity** - This changes the level trigger level to work when the sound level reduces. When selected the “Trigger Start When” will change to say under instead of exceeds, and “Trigger Stop When” becomes exceeds instead of under.

11) The **OK** Button – Click this button to accept and use the parameters and settings as specified on the screen.

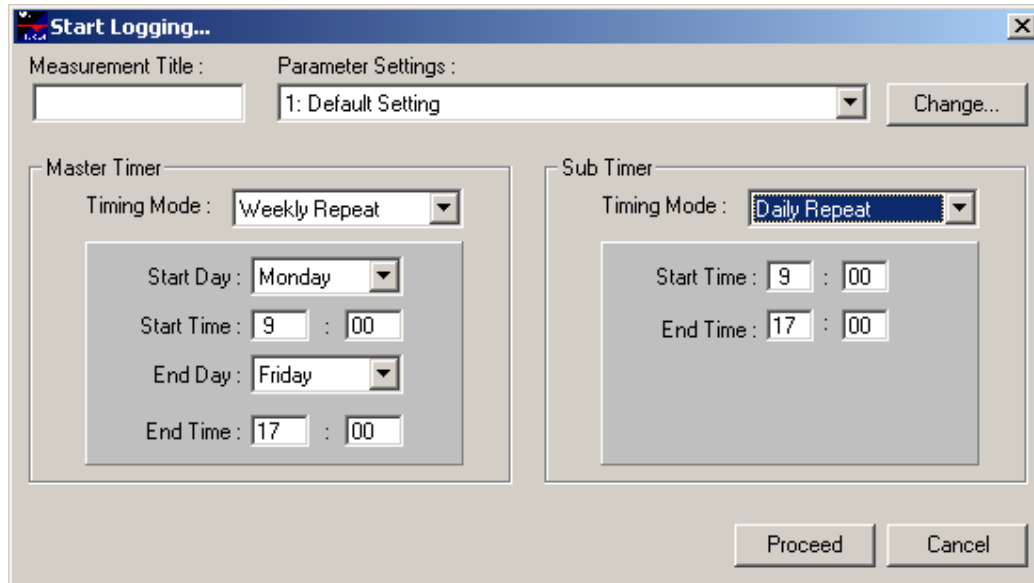
12) The **Cancel** Button – Click this button to close the window without using the selected parameters. Note that any saved parameter presets will remain as they are.

Notes on short term L_{eq} recording: -

- Memory will be filled much quicker when recording.
- When storing 1sec L_{eq} it takes about 28 hrs to fill the memory.
- Each trigger event will use more memory than if logging in standard statistical logging mode.

2.10 The Logging Window

This window allows for the configuration of the logger to commence a logging session. The logging window is illustrated below: -



The key features of the Logging window are: -

- 1) The **Measurement Title** Input Box - You may enter in up to 16 characters in this box.
- 2) The **Parameter and Settings** – If preset parameters are used, then this region appears as a pull-down list. The required set of parameters can be selected from this list. If custom settings are used, then a brief summary of the settings is displayed as in the above illustration.

- 3) The **Change** button – Use this button to bring up the parameter and settings window. In this window the parameters and settings can be completely tailored to meet the current requirements. This window can also be used to create or select parameter presets.
- 4) The **Master Timer Mode List** – Select the required mode for the master timer. The available modes are: -
 - **No Timers** - Logging is continuous, starting at the commencement of logging and ending when the user selects “Stop Logging”.
 - **Hourly Repeat** - The logger will commence logging at a set time each hour. Logging will be paused at the preset end time before recommencing in the next hour. The required times are entered as minutes after the hour. For example, the entered times could be 15 and 45 minutes past the hour. Selecting a logging session to start at 9:00 will result in logging to commence (data being calculated and stored) at 9:15. Logging would be suspended at 9:45 before recommencing at 10:15. This cycle would continue until the user selected “Stop Logging”.
 - **Daily Repeat** - This works the same as the hourly repeat, except that the logger logs once per day instead of once per hour. The required times are entered in hours and minutes. For example, the entered times could be 10:00 and 13:00 (note that the logger works in 24-hour time). If the logging session began at 9:00 the result will be logging commences (data being calculated and stored) at 10:00. Logging would be suspended at 13:00 before recommencing at 10:00 on the next day. This cycle would continue until the user selected “Stop Logging”.
 - **Weekly Repeat** - This works the same as the daily repeat, except that the logger logs once per week instead of once per day. The user is required to enter the start and stop days as well as the times.
 - **One Shot** - The logger will commence logging at the specified date and time and will log continuously until the date and time specified for the end. For example, it may be set to log between 09:00 on 1/1/2002 until 13:00 on 13/1/2002.
- 5) The **Master Timer Data** Fields – The data entered here is used for the control of the master timer. Note that the required information is dependent on the master timer mode selected.
- 6) The **Sub-Timer Mode** List – Use this list to select the mode for the sub-timer. The sub-timer modes are the same as the modes for the master-timer; with the exception that one-shot mode is not available on the sub-timer.
- 7) The **Sub-Timer Data** fields – These fields work in the same way as the master timer fields.
- 8) The **Proceed** Button - Use this button to accept the settings and enter the next phase of the start logging operation.
- 9) The **Cancel** Button - Use this button to cancel the logging operation and to return to the main window.

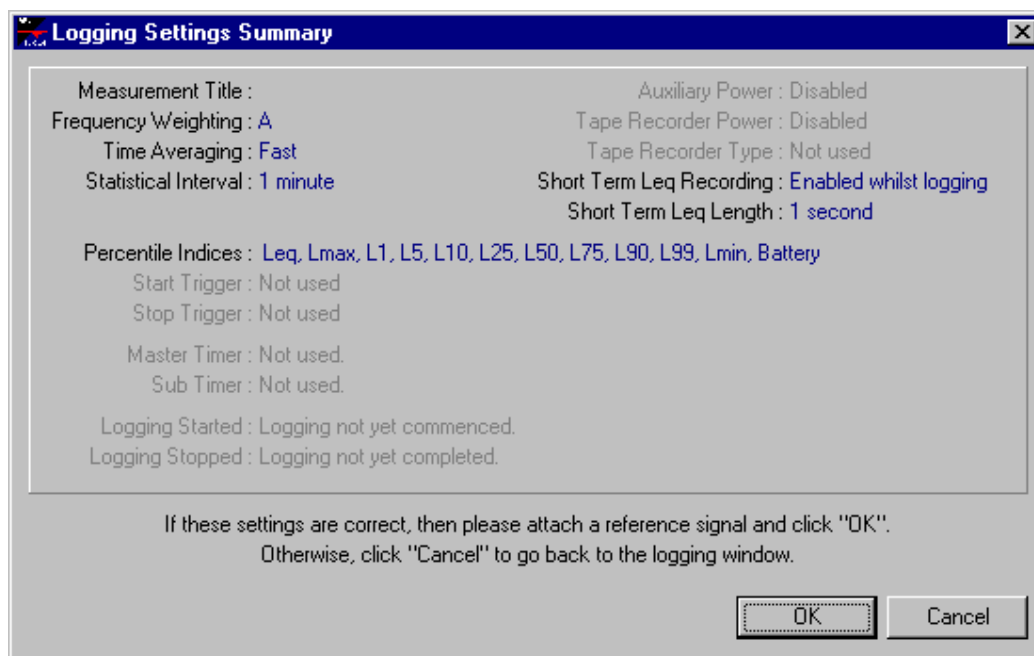
Notes on the Timers: -

- The timers are configured to work on an “and” system. That is, both timers must be on for logging to be done. For example, if the master timer is a daily repeat between 9:00 and 5:00 and the sub-timer is an hourly repeat between 30 and 45 minutes past the hour then logging will commence at 9:30.
- For convenience, limitations have been placed on allowable combinations of master timer mode and sub-timer mode. For example, having both modes set to daily is not allowed, as it is the same as having a single daily timer with more appropriate time information. The software will notify the user of any problems when the Proceed button is clicked. The on-line help also has information on this matter.

2.10.1 Summary Window

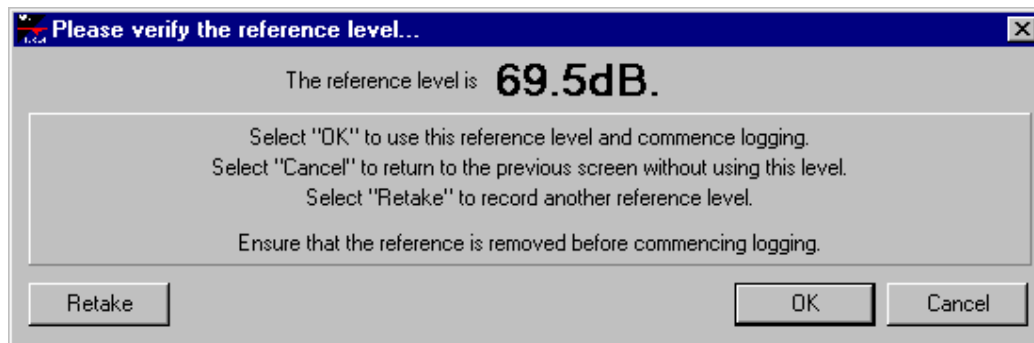
Once you have finished selecting the required options in the "Logging Window", (see previous section), this window will appear showing the setting you have chosen. OK will take you on to the Record Reference Window, cancel will take you back to the Logging Window.

Note that the reference will record as soon as you click OK.



2.10.2 Record Reference Window

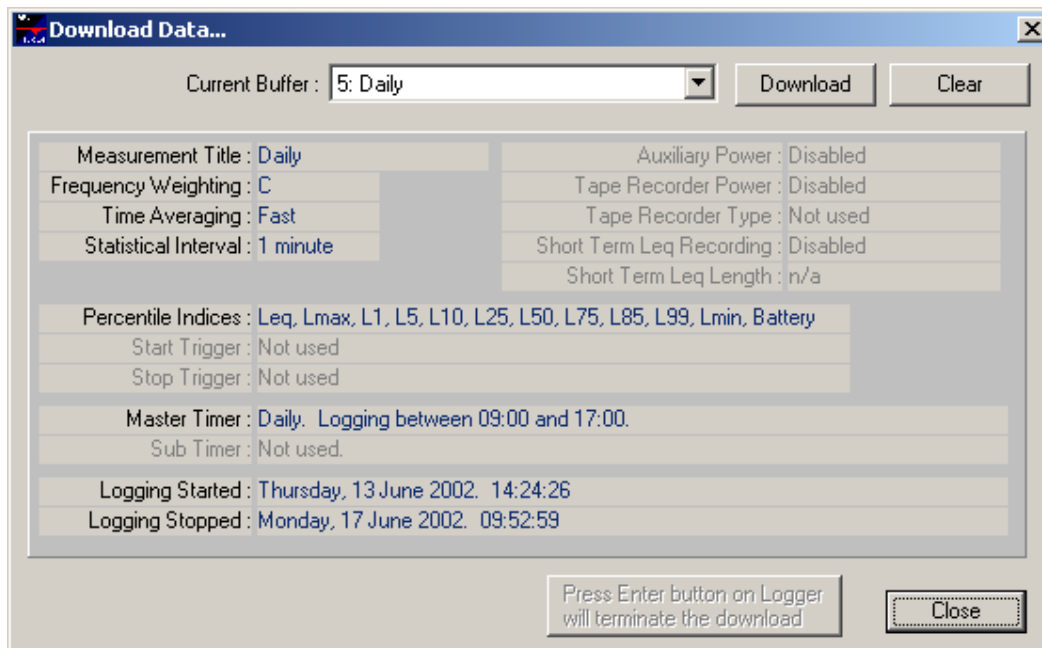
This is the last window in the logging set-up. It allows you to record a reference level at the start of your logging session. You can redo the reading by hitting "Retake". Cancel will take you back to the "Summary Window". OK will take you back to the "Main Window", where the status will now indicate Logging.



2.11 The Download Data Window

This window allows the user to scan through the logger's memory and to download data from the logger to the host PC.

Note that the user cannot bring up this window unless there is readable data in the logger.



The features of this window are as follows: -

- 1) **Current Buffer** List- Use this list to select the buffer that is to be shown and/or downloaded. The EL-31x may have up to eight buffers.

- 2) **Buffer Details** – This area shows details of the logging session that is stored in the currently selected buffer.
- 3) **Download Button** - Click this button to download the contents of the currently selected buffer. For further information see “Downloading Data” below. Pressing the Enter key on the logger can stop the download.
- 4) **Clear Button** - Click this button to permanently erase the contents of the buffer. Note that this button is only enabled when the last buffer is selected and the logger is in “Standby” mode.
- 5) **Close Button** - Click this button to return to the main window.

2.11.1 Downloading Data

Once the download buffer option is selected, a dialogue box will be displayed. This allows the user to enter a file name as well as select the directory they would like the data to be saved. The program will then commence acquiring the data from the logger. This process may take a minute or two, depending on the amount of data to be transferred. While the logger is downloading, a progress meter is displayed. Once the download is complete, a summary of the download will be displayed. This summary shows what files were actually created, how many records were downloaded and the time taken for the download. Click on the "OK" to return to the normal download window.

The host software generates the following files: -

- 1) The statistical data file (*_sta.csv). These files contain the statistical data that is calculated for each interval. The following data fields are in this file: -

- Date
- Time
- L_{eq}
- L_{max}
- The eight percentile indices as specified in the parameters for the logging session.
- L_{min}
- Battery Voltage
- Temperature
- Overload, 1 indicates overload, 0 means no overload

- 2) The events log file (*.log). This file lists any events that occurred during the logging session. Events include such things as triggers starting and stopping and short-term L_{eq} recording starting and stopping. Note that any errors are also listed here. This file should be checked after each logging session.

- 3) The short-term L_{eq} data file (*_leq.csv). This file stores any data from the short term L_{eq} recording. Since the L_{eq} files can be quite large, if they are greater than 14,400 L_{eq} s then the file is broken into separate files; eg test_leq0.csv, test_leq1.csv...up to test_leq6.csv. Note: “test” is used for explanation. The user names the file. With 1sec L_{eq} s this is equivalent to 4hrs data. If short term L_{eq} recording is disabled, then this file is not generated.

- 4) The header data file (*_hdr.csv) is only created on a dump all and will store the parameter settings for the eight logging sessions equating to each buffer.

3. The Front Panel

3.1 Introduction

The front panel the EL-31x allows interaction with the logger without a computer. This is often desirable when the logger is configured and used at remote locations. Moreover, the user may want to confirm accuracy or correct operation by using an acoustic calibrator.

The front panel has three buttons, <Select>, <Enter> and Wake-up and an LCD. These buttons are used to navigate through the menu structure or to change various parameters. The Front panel has all the capabilities of the host software with the following exceptions: -

- Data cannot be downloaded or viewed.
- The timers cannot be used.
- A system calibration cannot be performed.
- When configuring a logging session, the user can only set the statistical interval and frequency weighting.

3.2 Operational Description

Press and hold the "Wake-up" button until the LCD shows initialisation message. After a short pause, the LCD will display the message "0:Parameter". The front panel is now ready for use.

At this stage, <Select> will allow the user to cycle through the following menus: -

- 0:Parameter
- 0:Logging
- 0:Status

Pressing <Enter> on any of the menus will activate that menu.

Note: The EL-31X will time out and go to sleep in 60 seconds of no activity unless left on display SPL on the front panel display.

Caution: If the instrument is left in Display SPL, the potential exists for discharging the battery below the manufacturer's recommended low voltage.

3.3 The Parameter Menu

This menu allows the user to view and to change various parameters of the logger. Note that the parameters can only be changed when the logger is in "Standby" mode.

Note: The EL-31X will time out and go to sleep after approximately 60 seconds of no activity. Display SPL defeats timeout and the instrument will stay active indefinitely.

Caution: If the instrument is left in Display SPL, the potential exists for discharging the battery below the manufacturer's recommended low voltage.

Using the <Select> button, the user will be able to cycle through the following options: -

- 1:Set Interval
- 1:Set F-Weight
- 1:Exit Menu #1

Pressing <Enter> on any of the options will activate that option.

3.3.1 Set Interval

When this option is selected the LCD will show the current interval. The message will be of the form "Interval 15min". If the logger is not logging, then the user can scroll through the allowed statistical intervals using the <Select> button. Press <Enter> to make the displayed interval the current statistical interval.

3.3.2 Set F-Weight

When this option is selected the LCD shows the current frequency weighting. The message will be of the form " Weighting: A". If the logger is not logging, then the user can toggle between A-weighting and C-weighting using the <Select> button. Press <Enter> to accept the displayed weighting as the current frequency weighting.

3.3.3 Exit Menu #1

This will return the user to the main menu.

3.4 The Logging Menu

This menu allows the user to commence and to cease a logging session.

Using the <Select> button, the user will be able to cycle through the following options: -

- 2:Rec Ref Tone
- 2:Start Logging
- 2:Stop Logging
- 2:Exit Menu #2

Pressing <Enter> on any of the options will activate that option.

3.4.1 Record Reference Tone

This option will record a reference level. Next time logging is started or stopped, this level will be attached to the data. Once this option is selected, the LCD shows the level message of the form "Level = 94.0dB".

Ensure that an acoustic calibrator is attached to the microphone before selecting this option. The measurement is made as soon as the option is selected.

3.4.2 Start Logging

Selecting this option will cause the logger to commence logging using the current settings. The LCD will show the message "Logging Started".

Note that this command will not operate if any of the following conditions apply: -

- If the logger is already logging, then the error message "Already Logging!" will be displayed.
- If there is less than 1kB of memory remaining, then the error message "Out of memory!" will be displayed
- If all eight buffers have been used, then the error message "Buffers Corrupt." will be displayed.

3.4.3 Stop Logging

Selecting this option will cause the logger to end the current logging session. The LCD will show the message "Logging Stopped". If the logger was not logging, then the error message "Not Logging!" will be shown.

3.4.4 Exit Menu #2

Selecting this option will return the user to the main menu.

3.5 The Status Menu

This menu allows the user to check the general status of the logger.

Using the <Select> button, the user will be able to cycle through the following options: -

- 3:Show Status
- 3:Display SPL
- 3:Set Clock
- 3:Reset System
- 3:Exit Menu #3

Pressing <Enter> on any of the options will activate that option.

3.5.1 Show Status

This function shows various messages detailing the current status of the logger. Each message will appear on the LCD. If <Select> is pressed then the next message will be shown.

If <Enter> is pressed then the user will be returned to the menu. In order, the messages are

- Mode ("Logging", "Standby" or "Timers On").
- Current statistical interval
- Current frequency weighting
- Fast Time
- Available memory
- Battery Voltage in Vdc
- Current temperature
- Baud rate of RS-232 Communications
- Current time
- Current day
- Current date

After the last message is shown, control will return to the Status Menu.

3.5.2 Display SPL

Use this option to display the current sound pressure level as measured by the logger. A message will appear on the LCD of the form "SPL = 94.0dB". The LCD is continuously updated until the user presses the <Enter> button. Once the <Enter> button is pressed, control returns to the status menu. If an overload occurs, then a + appear after dB on the LCD. Pressing <Select> button can clear this. If EL-31X is logging then this will clear at the next statistical interval or, by the <Select> button; however, it will still log the overload.

3.5.3 Set Clock

This option allows the user to set the date and time on the loggers' clock. Once this option is selected, the time will be shown on the LCD. A cursor will appear under the first hour's digit. Pressing <Select> will increment the value of this digit. Press <Enter> to advance the cursor to the next digit. Repeat this sequence until the time is entered. The date will then be Displayed. The cursor will appear under the year digit. As with setting the time, use <Select> to increment a digit and <Enter> to advance to the next digit. Once all digits are entered control will return to the Status Menu.

Notes:

- 1) The digits are entered in the following order: -
 - Tens of hours
 - Unit hours
 - Tens of minutes
 - Unit minutes
 - Tens of seconds
 - Unit seconds
 - Day of the week.
 - Thousands of years
 - Hundreds of years
 - Tens of years
 - Unit years
 - Tens of months
 - Unit months
 - Tens of days
 - Unit days.
- 2) Each digit is automatically constrained to valid values. The allowable values are based on the data already entered. For example, if the ten-hour digit is 2, then the unit-hour digit is constrained to be between 0 and 3 inclusive. If the ten-hour digit is 0 or 1, then the unit-hours digit is constrained to be between 0 and 9 inclusive.
- 3) Continually pressing the <Select> button will eventually cause the digit to wrap-around.
- 4) Rules for allowable dates are the same as those given in the clock section

3.5.4 Reset System

This option allows the user to reset the system. When selected, the user will be asked to confirm the decision. Pressing the <Select> button will toggle between the responses "Yes" and "No". Pressing the <Enter> button will accept the response. If you respond "Yes", then the logger will be reset and the following happens:

- The system calibration is returned to the default value.
- The temperature calibration is returned to the default value.
- The logger is placed into "Standby" mode.
- The logger defaults to: "Weighting: A", "Fast Time" and "Interval 15 min.".
- All data stored in memory is erased.

Note: The memory can be reclaimed by carrying out the “Dump All” function in the Set Up menu of the host software. Only if no other data has been stored in the available memory.

3.5.5 Exit Menu #3

Selecting this option will return the user to the main menu.

4. GSM Modem Configuration

If the EL-31X is equipped with a GSM modem for remote operation, the modem's configuration is correctly set when supplied by Acoustic Research Laboratories. Settings should not be altered unless absolutely necessary. Persons familiar with modem operation should only carry out the instructions supplied here.

Connecting it to a computer running a terminal program via a serial cable configures the modem. Most terminal programs are suitable for this and one of the easiest to use is the program called Terminal that was supplied with Microsoft Windows™ 3.X. Instructions given here apply to a computer running this program although they will apply equally to most other terminal programs.

Note: Windows NT and 2000 may interfere with some older terminal programs preventing them from accessing the serial port. You may get no error message. They just don't work!

The following instructions include command strings that should be typed on the computer. Their italic font face illustrates the command strings. All commands should be appended by a carriage return (the ENTER key). The command letters can be upper case or lower-case. Connect the modem's RS-232 port to a free serial port on the computer using a standard RS-232C serial cable,

Open the terminal program,

Type *AT <ENTER>*. The modem should respond with 'OK'. If there is no response from the modem, check that it is correctly powered and check that the serial cable is correctly connected at both ends. If gibberish appears instead of 'OK', try a different communications speed. Refer to the instructions of the terminal program you are using on how to change this speed.

Type *AT&F&D0&C0S0=2+IPR=9600&WZ0 <ENTER>*. Again, the modem should respond with 'OK'. If so, the GSM modem is now configured for correct operation with the EL-31X. Note from now on, the GSM modem will communicate with the host at 9600bps. If you wish to perform further changes to the modem setup, you will need to change the terminal program speed to 9600bps, and communication method to modem.

Your GSM modem should now be ready for use with the EL-31X. Before placing the EL-31X in the field, communications should be tested. Run the EL-31X host software and link to the logger remotely to check that all functions operate correctly.

Warning: While the EL-31X is linked Via Modem/GSM DO NOT RESET

If you reset the logger the communication may not re-establish. Use the reset only as a last resort. It will require restarting the host program and redialing.

4.1 GSM Data Number

The GSM modem uses the same standard SIM card that is used in GSM cellular telephones. Before the SIM card can be used in the EL-31X's GSM modem however, a Data Number must be attached to the card as well as the voice number. The data number is a separate number, that forms the basis of a connection for transmitting and receiving data only. A data connection can also be used to send and receive facsimile and email data. Consult your Cellular Network Service Provider for more information about obtaining a data number.

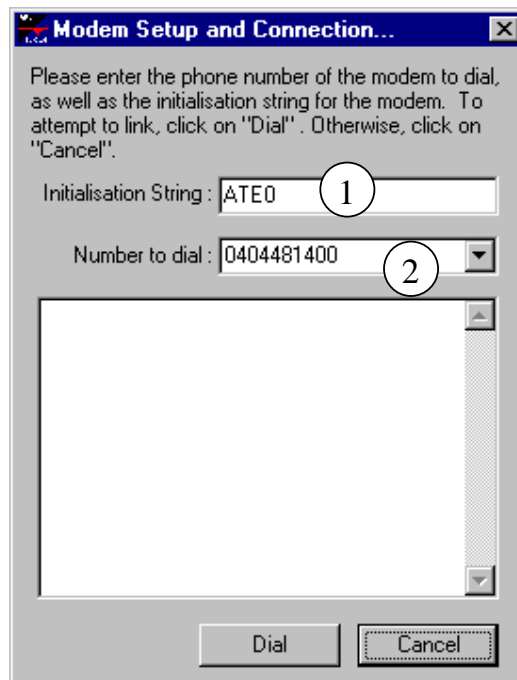
4.2 Next Call Type

After a data number has been attached to the SIM card, the cellular connection must be advised that the next call received will be a data call and not a voice call. This is normally achieved by setting an item in the telephone's menu such as Next Call Type. This should be set to Data. Consult your cellular telephone manual or telephone supplier for more information about how to set the Next Call Type.

4.3 Modem Window

From this window the user can configure the modem and dial the remote modem in order to link to a logger.

The modem window is illustrated below.



1). The Initialisation String entry field. Text entered into this field is sent to the modem before dialling. It is strongly recommended that this string be left with its default settings as an incorrect command string could result in the inability to link to a logger.

2). The Phone Number text entry field. Text entered into this field is used as the phone number that is dialled. The number should be entered exactly as it should be dialled, including any necessary area codes. Do not insert any spaces between the numbers.

This field defaults to the last phone number entered.

Specifications

	EL-315	EL-316
Applicable Standards	AS1259.1 (1990), Type 2 AS1259.2 (1992), Type 2 AS2064 Group A, Class 1	AS1259.1 (1990), Type 1 AS1259.2 (1992), Type 1 AS2064 Group A, Class 1
Microphone	½" Rion UC-52	½" Rion UC-53
Reference Level	94.0dB @ 1000Hz	
Frequency Weightings	A C	
Time Averaging	Fast L_{eq}	
Noise Floor	< 24dB	
Measurement Range	30dB to 120dB	
Statistical Parameters	L_{MIN} , L_{MAX} , L_{eq} Eight percentile indices, user selectable	
Statistical Intervals ¹	1, 2, 3, 4, 5, 10, 15, 20, 30 and 60 minutes.	
Short Term L_{eq}	Selectable for continuous, or on trigger, with selectable lengths of 1,2,4,8,10,20,30,60 seconds.	
Timer Control	Timer control is accomplished through a master timer and an embedded sub-timer. Allowable timer modes are continuous, one-shot, weekly repeat, daily repeat and hourly repeat.	
Memory Capacity ²	~7,900 Statistical Intervals in up to 8 buffers.	
Temperature Sensor Range	-15°C to +60°C	
Temperature Sensor Accuracy ³	±2°C	
Overload	Yes	
Communications Protocol	RS-232-C	
Power consumption @ 12V	~70mA (Operating) < 200 μ A (Sleep)	
Size	300mm x 150mm x 340mm	
Weight	~4kg excluding battery.	

Notes: -

1. The intervals over which the logger calculates the statistics of the noise data may vary between 1 minute and 1 hour. However, the times when each set of statistics is calculated are fixed as follows.

Statistical Interval (minutes)	Statistical Calculation Times
1	The start of each minute.
2	The start of each even minute.
3	The start of every third minute (0, 3, 6 etc.).
4	The start of every fourth minute (0, 4, 8 etc.).
5	The start of every fifth minute (0, 5, 10 etc.).
10	The start of every tenth minute (0, 10, 20 etc.).
15	The start of every fifteenth minute (0, 15, 30 etc.).
20	The start of every twentieth minute (0, 20 and 40).
30	The start of every thirtieth minute (0 and 30).
60	Every hour on the hour.

For example: If the logger is started at 10:50 with a statistical interval of 30 minutes, then the first statistical calculation will comprise only 10 minutes of data, and time stamped in the results as 11:00. The next and subsequent intervals will contain the full 30 minutes of data, and time stamped as 11:30, 12:00 and so on.

2. Memory usage is dependant on the logger settings. A statistical interval is considered in the specifications as not including short term L_{eq} enabled.
3. A sensor on the logger circuitry measures the temperature. The displayed temperature may differ considerably with the ambient temperature. Accuracy is achieved once the sensor has been calibrated using the host software.