Endevco®

4830B AccelerometerSimulator
IM4830B

Instruction manual

SAFETY CONSIDERATIONS

This equipment has been designed and tested in accordance with the following standards:

EN61326-1:2006	Electrical equipment for measurement, control and laboratory use – Group1, Class A (Emissions)
EN61326-1:2006	Electrical equipment for measurement, control and laboratory use – Industrial Location Immunity
EN61000-3-2:2006 (+A1/A2)	Electromagnetic compatibility (EMC) – Part 3-2
EN61000-3-3:2008	Electromagnetic compatibility (EMC) – Part 3-3
CFR 47, Class A	Code of Federal Regulations: Pt 15, Subpart B

The 4830B has been tested as an Unintentional radiator (sub part B) and as a Class A product

RADIO AND TELEVISION INTERFERENCE
NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

In order to maintain compliance with FCC regulations shielded cables must be used with this equipment.
Operation with non-approved equipment or unshielded cables is likely to result in interference to radio & television reception.

This equipment is not designed to be used in potentially explosive environments. It should not be used in the presence of flammable liquids or gases.
This manual contains information and warnings that must be followed to ensure safety of personnel and the safe operation of the equipment.

Warnings:
Switch off all power to equipment before connecting or disconnecting the digital interface. Failure to do so may cause damage to the equipment.
Any adjustment, maintenance or repair, other than detailed within this manual, must be carried out by trained service personnel.
If it is suspected that the correct operation of the equipment is threatened, impaired or otherwise, it must be made safe and free from further operation until the threat has been removed.

Rohs Compliant   2011/65/EU

Waste Electronic and Electronic Equipment Directive: 2012/19/EU
This product complies with the WEEE Directive (2012/19/EU) marking requirement. The affixed product label (below) indicates that you must not dispose this electrical/electronic product in domestic household waste.

To return unwanted product for disposal, please contact your local MSS representative.

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1.0   Product description

The 4830B accelerometer simulator is a hand held battery operated signal generator designed specifically to simulate the electrical output of common types of accelerometers. The instrument contains a highly accurate oscillator with an adjustable output level and is ideal for setting up, testing and the diagnosis of faults within data acquisition systems, FFT analyzers, environmental test systems or simply as a flexible signal generator.

The instrument provides AC output signals which mimic those of either voltage mode accelerometers (generic IEPE, Isotron® types etc.) or charge mode accelerometers (both single ended and differential configurations). The simulation outputs are conveniently scaled in units of acceleration, i.e. "g", as mV/g (millivolt) or pC/g (pico-coulomb) signals as appropriate, although the outputs can be configured to be proportional to units of velocity or displacement. An auto-calculating on screen "Vibration Calculator" provides the user with corresponding values in respect of m/s², ips, mils, mm and m/s based units.

The instrument also features a TTL compatible tachometer output which allows operators of condition monitoring systems to set signal conditioning tracking filter center frequencies without the need to generate an external, real time tachometer signal. The tachometer frequency is adjustable as a ratio of the respective output signal frequency.

The 4830B also features the ability to analyze a vibration signal using a Fast Fourier Transfer function. This allows a voltage proportional vibration signal to be inputted to the instrument thereby providing an indication of both frequency and magnitude.

Simulation parameters can be selected, adjusted, and saved as a "profile" either by the front panel keypad or using the supplied utility program. Use of the utility program not only allows profiles to be created and saved but also organized into specific "profile sets" which can be conveniently stored on a PC. Up to 40 user profiles may be downloaded to the simulator at any one time.

2.0   User interface

Front panel key pad

Ⓐ HOME

Ⓑ PROFILES

Ⓒ TOOLS

Ⓓ ENTER

Ⓔ Arrows: up, down, left, right

Connections

Ⓕ mV / IEPE out (BNC)

Ⓖ Tacho out / FFT in (BNC)

Ⓗ Single-ended charge out (BNC)

Ⓘ Differential charge out (twinax)

Ⓙ mV / IEPE selection indicator

Base panel

Ⓚ Mini USB connector

Ⓛ 2.5mm charger input socket

Ⓜ Fast / full charge indicator

Ⓝ On / off switch

Figure 1: 4830B user interface

3.0 Basic operation

3.1. Menu structure

The simulatormenusare accessed via the three menu keys as shown in **Figure 2**below.
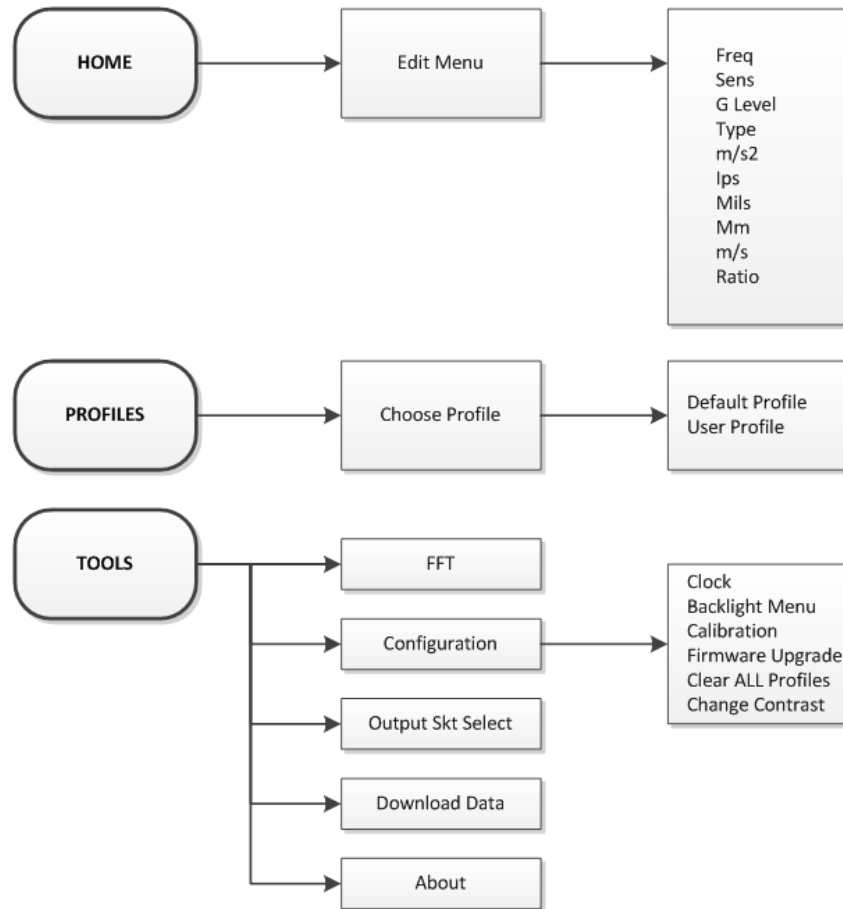
Figure 2: Menu structure

3.2. Home screen

The home screen is in two parts, upper and lower. When the simulator is turned on, the upper screen becomes the default. This screen shows the "Profile" in use and an overview of the four primary simulation parameters. The secondary parameters are shown in the lower screen. Moving between the upper and lower screens is accomplished by pressing the up and down arrow keys. Pressing the *HOME* menu key at any point will return the display to the home screen.

Figure 3: Home screen, upper

```
mV ▲
       m / s 2  :    9 8 . 0 6 6 5
         i p s  :    6 . 1 4 4 7 9
       M i l s  :    1 9 . 5 5 9 6
         m m    :    0 . 4 9 6 8 1
         m / s  :    0 . 1 5 6 0 8
     R a t i o  :    1 . 0 0 0
```

Figure 4: Home screen, lower

3.3.   Editing screen

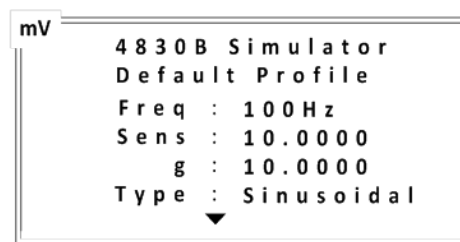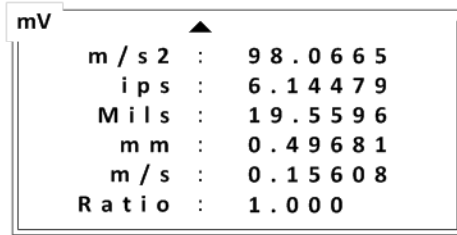The editing screenis accessed by pressing either the left or right arrow keys when in the home screen. Similar to the home screen, the editing screens are in two parts, i.e. primary and secondary parameters. Scroll up or down with the arrow keys to move between parameters and the upper and lower screens. Move the cursor (inverted text) to the parameter that is to be edited, and select by pressing the *ENTER* key. See section4.1for details on editing a parameter.
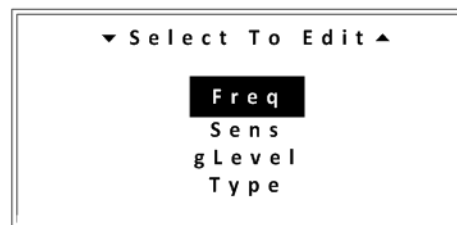
```
      ▼ S e l e c t  T o  E d i t ▲

              F r e q
              S e n s
            g L e v e l
              T y p e
```

Figure 5: Edit screen, upper

```
   ▼                          ▲
              m / s 2
              i p s
              M i l s
              m m
              m / s
            R a t i o
```
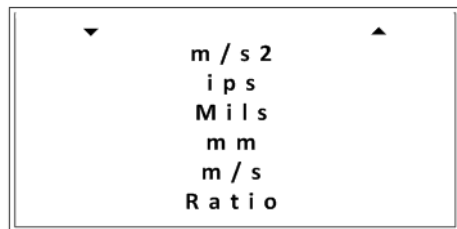
Figure 6: Edit screen, lower

3.4.   The "Profile"

A "Profile" is a set of parameters that combine to form the simulation. Parameters include:
- Signal frequency (Freq)
- Accelerometer sensitivity (Sens)
- Acceleration level (g)
- Waveform type (Type)
- Acceleration level (m/s^2)
- Velocity (ips)
- Displacement (mils)
- Displacement (mm)
- Velocity (m/s)
- Ratio

In terms of simulating an accelerometer, the primary parameters are: sensitivity, acceleration level (g), frequency and waveform type. These are displayed in the upper home screen. The secondary parameters, other than ratio, are obtained by calculation, taking into account the frequency and acceleration level. These secondary parameters are displayed in the lower home screen. The calculations are performed automatically whenever a parameter is changed. Note: All profile parameters can be changed within the

edit screens. When a secondary parameter is changed the g level value will change as a result. See section 4.2.2for details.

3.4.1. Default profile

The default profile is loaded for convenience when the simulator is turned ON. The default profile contains pre-set simulation parameters which cannot be permanently overwritten. All of the parameters can be adjusted at the time (on the fly), but **not saved**. The default profile primary parameters are:

- Frequency = 100Hz
- Sensitivity = 10.0000 (mV or pC)
- g level = 10.0000
- Type: Sinusoidal

3.4.2. User profile

The user can create a profile which contains specific simulation parameters, i.e. the parameters are adjusted to meet the requirements of a particular test. A maximum of 40 profiles can be stored within the simulator, each with a unique identification. Unlike the default profile, a user profile can be edited and **saved** on the fly. See section 4.3for details on creating a "User profile". Note: Downloading a new profile set will erase any user profiles saved within the simulator.

3.4.3. Profile selection

Profile selection is accessed by pressing the *PROFILES*menu key.   Scroll up or down with the arrow keys to move between profiles and select the profile required by pressing the *ENTER*key.
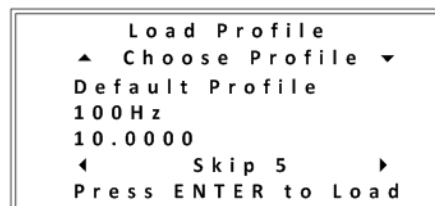
Figure 7: Profile selection

3.5.   Tools

Access to the tools menu is accomplished by pressing the *TOOLS*key.

Figure 8: Tools menu

Scroll up or down with the arrow keys to move the cursor (inverted text) to the required field, and press the *ENTER* key.

3.5.1. FFT

The simulator features a basic FFT (Fast Fourier Transfer) function. This feature allows users to identify the fundamental frequency and order of magnitude, of a complex vibration or similar waveform.   The signal is inputted into the simulator using the shared Tach / FCN BNC connector. The tachometer output function is disabled once FFT mode has been selected. **Users should**

therefore only connect an external signal to the Tach / FCN BNC once the FFT function has been selected. It should be noted that the maximum input capability of the FFT input is **5V pk**. See section4.7for further details on the operation.

3.5.2. Configuration

Within the configuration menu, further menus are selectable; refer to Figure 2for details.

3.5.2.1. Clock

The simulator has a real time clock installed primarily to record the date when a calibration is performed. It has a 24 hour time format and an ISO 8601 date format of yyyy:mm:dd. See section 4.8for details on setting the time and date.

3.5.2.2. Backlight menu

To optimize battery life the backlight can be set for ON (timed) or permanently OFF. In the ON mode, the backlight will remain on for approximately 30 seconds from the last key press, after which it will extinguish. A subsequent key press will turn the backlight on for a further 30 seconds. In the FFT mode, the backlight will remain on, if selected, i.e. the 30 second timer is disabled in this mode. See section 4.9for further details.

3.5.2.3. Calibration

The calibration mode allows for the simulator to be calibrated without the need for removing covers or calibration seals. A unique password, supplied with the simulator at the time of delivery, is needed to gain access to the calibration process. For security, and to avoid inadvertent calibration, the password should remain with authorized personnel. See section 5.1for the calibration procedure.

3.5.2.4. Firmware upgrade

Should it be necessary to upgrade the firmware at any stage, the process will be initiatedwithin this routine. Full details on how to install the upgrade will be providedat the time a firmware upgrade is needed.

3.5.2.5. Clear all profiles

Selecting this menu option allows for the quick removal of all stored user profiles. The user has to confirm the action before initiating.

3.5.2.6. Change contrast

Select this menu option for adjusting the display contrast. See section 4.10for details.

3.5.3. Output socket select

The mV/IEPE output is configured to simulate either a single ended millivolt source or an IEPE biased millivolt source. It is important that before making any connections to the simulator, it is correctly configured for the application, i.e. select mV or IEPE as appropriate. The current setting is shown in the top left corner of the home screens. Note: This is a global setting. See section 4.11for details.

3.5.4. Download data

Selecting this menu option prepares the simulator for communication with a PC allowing the download of user profiles into the simulator and the synchronization of the real time clock.

3.5.5. About

Select to see information on the date of manufacture (D.o.M), the serial number of the simulator, firmware revision and the date of the last calibration.
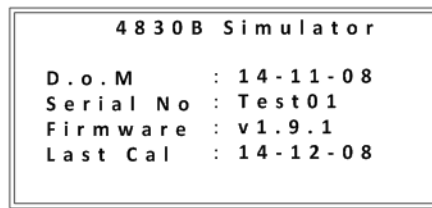
Figure 9: About screen

3.6. Power

The simulator is primarily a battery powered instrument. Power comes from an internal rechargeable Li-on cell pack. A universal power adapter is supplied with the simulator which can be used to charge the internal battery or to power the simulator from an AC outlet. Note: When charging the battery with the simulator turned on, power is shared with the effect of increased charging times. To prolong the life of the internal battery it is recommended that the charger is unplugged from the simulator once the charge indicator has extinguished. See section 4.13for further details on charging.

3.6.1. Low battery indicator

The low battery indicator will appear on the right side of the display screens as shown below. When the indicator appears the user has approximately 10 minutes of useable time remaining before the simulator turns off.
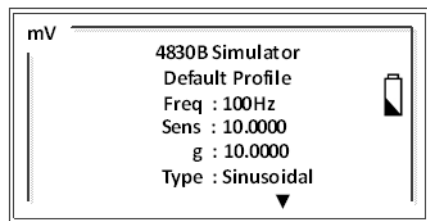

Figure 10: Low battery indicator

3.6.2. Battery charge indicator

The charge indicator is located on the base of the simulator above the DC power jack socket. In the fast charge state the indicator flashes green. In the trickle charge mode the indicator will be a solid green for approximately 45 minutes. A red indication means a fault has been detected.

3.7. Output types and typical connection configurations

The simulator provides AC output signals that mimic those of charge mode piezoelectric (PE) accelerometers (both single ended and differential configurations) and voltage mode piezoelectric accelerometers - often referred to generically as IEPE accelerometers (Integral Electronics Piezoelectric). Outputs are provided in the form of pC (Pico coulomb) or mV (millivolt) signals as appropriate.

IEPE accelerometers have an output where the AC vibration signal is superimposed upon a DC bias level. The DC bias level is typically in the range of 10 to 12V and is result of the constant current, normally in the range of 2mA to 20mA, from the IEPE power supply. When in the IEPE mode, the simulator sinks the constant current from the power supply and sets a DC bias of approximately 10.5V which is required for correct operation by most IEPE signal conditioners.

The simulator is thus compatible with signal conditioning equipment such as charge amplifiers, remote charge converters, IEPE power supplies and IEPE signal conditioners. In addition the simulator may also be compatible with conditioners requiring a simple, unbiased mV input signal.

Examples of typical connection configurations for the 4830B are shown in Figure 11.

Single ended PE accelerometer simulation
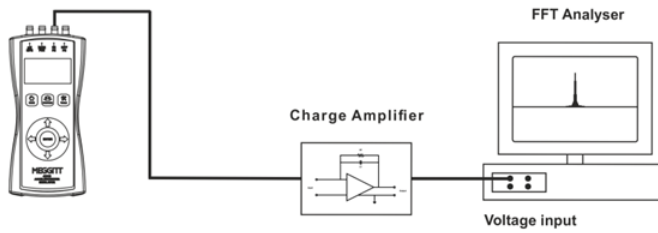
Single ended PE accelerometer simulation
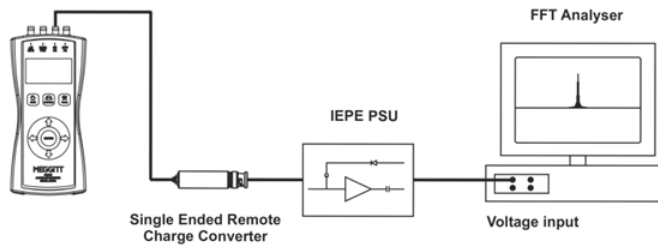
IEPE Accelerometer Simulation

Differential PE Accelerometer Simulation

Differential PE Accelerometer and Tachometer Simulation

Figure 11: Typical connection configurations

4.0 Detailed operation

4.1. Parameter editing

The editing function is the same process for all parameters with the exception of **Type**. From the home screen, press either the left or r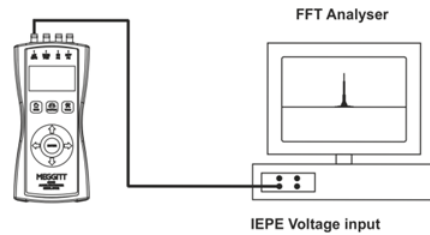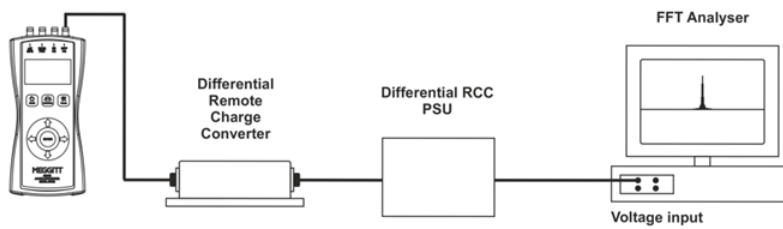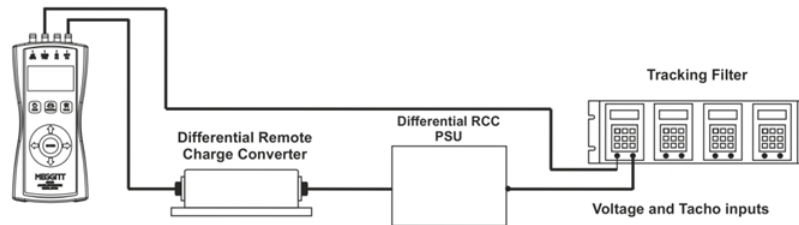ight arrow keys to enter the editing screens. Using the up and down arrow keys, move the cursor (inverted text) to the parameter to be edited, and select by pressing the *ENTER* key. For example, selecting "Freq" will display the editing screen for frequency.
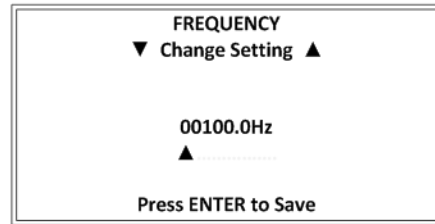
Figure 12: Frequency edit screen

Use the left and right arrow keys to place the edit cursor (▲) at the point to edit, then use the up and down arrow keys to adjust the value. If a value is entered that exceeds the limits for the simulator, an "**Out of Range**" message will be displayed, and the value cannot be saved.
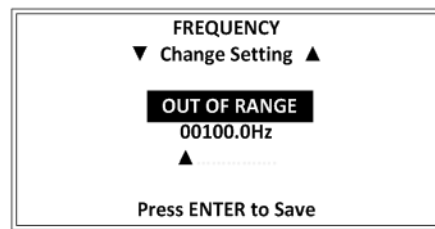
Figure 13: Out of range message

The waveform **Type** uses only the up and down arrow keys for editing. Select from sinusoidal, triangular or square wave by using these keys.

4.2. Calculated parameters

4.2.1. Relationships

Whenever the values of "freq" or" g level" are changed, the secondary parameters are automatically recalculated. The secondary parameters, i.e. ips, m/s, mils and mm are calculated using the following relationships:

$$ips = (g/f) * 61.447906; \quad mils = (g/f^2)*19559.47$$

$$m/s = (g/f) * 1.5607768; \quad mm = (g/f^2)*496.81$$

Note: These relationships are valid only for a sinusoidal waveform.

The value for m/s^2 is calculated using the constant 1g = 9.80665m/s^2

4.2.2. Back calculation

The secondary parameter values can be edited in the same way as the primary parameters, i.e. "Freq", "Sens" and "g level". As the simulator is simulating an accelerometer having an output as a function of acceleration g, then any change in the value of a secondary parameter must affect the

value of the primary parameter g. Using the relationships above, the value of g will be adjusted whenever a secondary parameter is edited. This happens automatically when the new value of secondary parameter is saved. Note: This function is only operational in a user profile.

4.2.3. Display Format

The numerical range of calculated secondary parameters is very wide, in the order of $1*10^{-9}$ to $1*10^{9}$. For this reason, values are displayed in standard number form when in the range 0.001 to 100000 and in scientific notation when outside this range.   Scientific display in the home screen is limited to the format x.xx e xx, whereas in the edit screens the format is x.xxxxx e xx.

```
mV              ▲
    m/s2 :    0.09807
     ips :    3.07e-05
    Mils :    4.89e-07
      mm :    1.24e-08
     m/s :    7.80e-07
   Ratio :    1.000
```
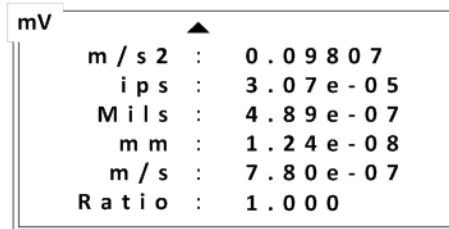
Figure 14: Format, home screen

```
            ips
      ▼ Change Setting ▲


          3.07240e-05
          ▲ ················

      Press ENTER to Save
```
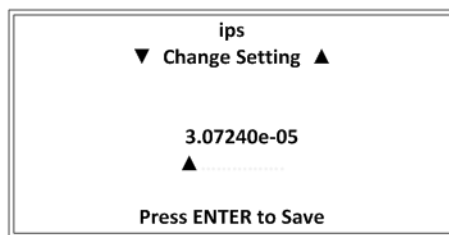
Figure 15: Format, edit screen

4.3. Creating and saving a user profile

"User profiles" can be created and saved into internal memory using the key pad. A maximum of 40 user profiles can be saved within internal memory for quick and easy retrieval. To create a user profile, use the following procedure, which assumes that only the default profile is present.

Starting from the home screen press the *PROFILES* menu key. The profiles menu is now displayed and is showing details of the default profile. Press the *PROFILES* menu key again. The message "Writing Profile" will be displayed, indicating that a new profile is being created. The Simulator creates all new profiles with the parameters of the default profile. The new profile will be allocated a sequential number and will be displayed as User Profile "X". Note: Downloading a profile set will erase any user profiles saved in the simulator.

```
        Load Profile
     ▲  Choose Profile  ▼
      WRITING PROFILE
     Default Profile
     100Hz
     10.0000
     ◄        Skip 5        ►
     Press ENTER to Load
```

Figure 16: Writing profile message

A short message follows indicating the profiles are being saved to memory. The display will now look like this:

```
        Load  Profile1
    ▲   Choose  Profile   ▼

UserProfile1
100Hz
10.0000
◄           Skip 5          ►
Press  ENTER  to  Load
```
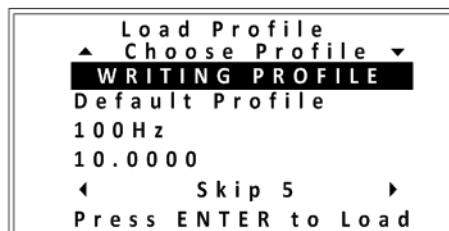
Figure 17: Profile after save

Press*ENTER* to load and view the profile. The upper home screen now shows the user profile name.   The profile parameters can now be edited as previously described in paragraph 4.1.   After editing, a "Profile Saved" message is briefly shown on the display indicating the changes have been saved to memory.

4.4.   Accessing stored user profiles

User profiles stored in the simulator's internal memory are accessed in the profiles menu. Starting from the home screen press the *PROFILES* menu key. The profile number / name and first two parameters (frequency and sensitivity) of the last profile used / viewed are now visible. Use the up and down arrow keys to step through the stored profiles. It is also possible to jump through the stored profiles in steps of 5 using the left and right arrow keys. Press the *ENTER*key to load the required profile.

4.5.   Clearinguser profiles

User profiles stored in the simulator's internal memory may be removed using the "Clear All Profiles" function in the tools menu. It should be noted that this function will clear **all** of the user profiles stored within memory. Note: It is not possible to remove individual profiles using this function.

Profile removal (**all**) using the front panel keypad is performed as follows:

From the home screen press the *TOOLS*menu key. Using the down arrow key step through the menu until "CONFIGURATION" is highlighted. Press the *ENTER* key. Again using the down arrow key, step through the menu until "Clear All Profiles" is highlighted. Press the *ENTER* key. The "Clear Profiles" screen is now displayed. Using the up arrow key select "Yes" and press the *ENTER* key.

```
        CLEAR PROFILES
    ▲   Change Setting   ▼


             No


        Press ENTER to exit
```
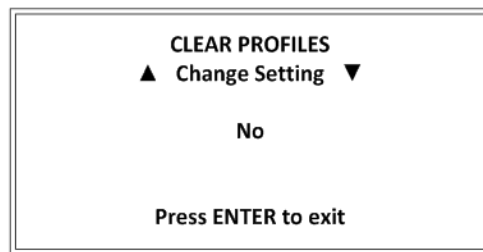
Figure 18: Clear profiles

The message "Clearing Profiles" is now displayed with a rolling count as the profiles are cleared. Once all of the profiles have been cleared the screen will default to the home screen. Note: All 40 memory locations will be cleared irrespective of the number of stored user profiles.

4.6.   Tachometer output

The tachometer function is a TTL compatible output, the frequency of which is set as a ratio of the main accelerometer output frequency, e.g. a ratio setting of 3.333 with an accelerometer output frequency of 100Hz would generate a frequency at the tachometer output of 333.3 Hz. This feature is useful when testing condition monitoring systems that employ tracking filters, and which require external tachometer signals.

The setting of the tachometer ratio is achieved as follows:

In the profile to be edited press the left or right arrow keys. The edit menu is now displayed and the header "Select to edit" is now visible. Step down through the menu using the down arrow key until "Ratio" is highlighted. Press the *ENTER* key.

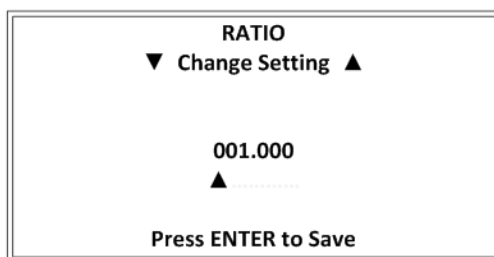The ratio edit screen is now shown and the value can be changed as previously described in paragraph4.1.

Figure 19: Ratio edit screen

Note: The tachometer output shares a connector with the FFT input. The default setting is the tachometer output. Before making any connections, ensure the simulator is appropriately set for the required function.

4.7. FFT

The FFT screen is a scaled graticule representing the selected bandwidth in the x axis and the amplitude in the y axis. Four selectable bandwidths are available: 0 – 150Hz, 0 – 500Hz, 0 – 5 kHz and 0 – 50 kHz. Use the left and right arrow keys to move between ranges. An indication of the selected bandwidth is shown in the top right of the display. The FFT function automatically picks the fundamental and this is shown in the top left of the display. Note: If the fundamental is measured as being below 5 Hz, it will be shown as ‹5Hz on the display.
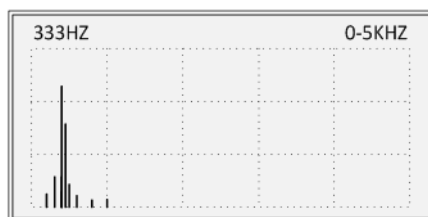
Figure 20: FFT screen

Amplitude range is limited to 0 – 5Vpk. It can be adjusted using the Up and Down arrow keys for best noise and sideband rejection. When in the FFT mode the display backlight will remain on permanently if selected to ON in the tools menu, i.e. it will not extinguish after 30 seconds.

Press the *HOME*menu key to exit the FFT function and return to the home screen.

4.8. Setting the clock

From the home screen press the *TOOLS*menu key. Using the down arrow key, step through the menu until "CONFIGURATION" is highlighted. Press the *ENTER* key. In the configuration menu step through the menu until the word "Clock" is highlighted. Press the *ENTER* key. The clock screen is now visible - time and date are displayed.

To set or edit the time and date parameters press the left or right arrow keys to step though the different fields:

- Set hours
- Set minutes
- Set day
- Set month
- Set year

Figure 21: Clock setting screen

Editing of values in the field selected is achieved using the up or down arrow keys. Once all necessary changes have been made, press *ENTER* to exit. The display will then return to the home screen.
Note! Ensure that the time and date are correct before performing a calibration of the Simulator.

4.9.   Backlight operation

Enabling or disabling of the simulator's backlight is achieved as follows:

From the home screen press the *TOOLS* menu key. Using the down arrow key step through the menu until "CONFIGURATION" is highlighted. Press the *ENTER* key. In the configuration menu step through the menu until the word "Backlight Menu" is highlighted. Press the *ENTER* key. The "Backlight Menu" screen is now displayed.

Figure 22: Backlight menu screen

Use the up and down arrow keys to switch between backlight ON and backlight OFF. Press the *ENTER* key to save the setting. The display will now return to the home screen.

The backlight can also be toggled on or off by pressing and holding down the home key for approximately 3 seconds. Note that when in the FFT mode, the backlight will remain ON, if selected, i.e. the 30 second timer is disabled in this mode.

4.10. Setting the display contrast

The display contrast is adjusted as follows:
From the home screen press the *TOOLS* menu key. Using the down arrow step through the menu until "CONFIGURATION" is highlighted. Press the *ENTER* key. In the configuration menu step through the menu until the word "Change Contrast" is highlighted. Press the *ENTER* key. The "Adjust Level " screen is now displayed.
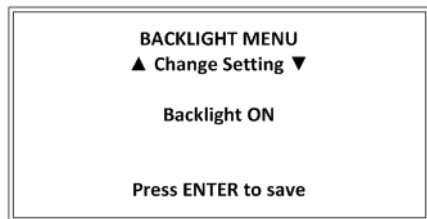
Figure 23: Adjust contrast screen

Using the up and down arrows increase or decrease the contrast as required. Press the *ENTER* key to save the setting. The display will now return to the home screen.

4.11. Output socket select

The mV/IEPE output can be configured to simulate either a single ended millivolt source or an IEPE biased millivolt source. In the IEPE configuration the simulator sinks the supply current from the IEPE signal conditioner/power supply and sets the correct operating DC bias. It is important that before making any connections to the simulator, it is correctly configured for the application, i.e. select mV or IEPE as appropriate.

From the home screen press the *TOOLS* menu key. Using the down arrow step through the menu until "OUTPUT SKT SELECT" is highlighted. Press the *ENTER* key. The output socket select screen is now displayed.
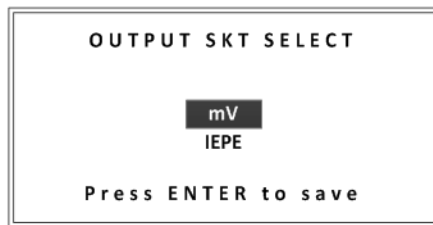

Figure 24: Output SKT select screen

Use the up and down keys to change the configuration. Press the *ENTER* key to save and exit to the home screen.

4.12. Master reset

The simulator can be reset from the key pad should it be necessary. To perform the reset, simultaneously press the up and left arrow keys. The display will go blank and then reinitialize. Performing a master reset will not affect the default or user profiles stored within memory.

4.13. Battery charging

Power for the simulator comes from an internal Li-on cell pack, and a supplied external universal power adapter. The power adapter functions as a charger for the internal battery, but also will power the simulator in addition. Battery charge and discharge are managed by internal circuitry to provide a safe and effective environment for the battery to operate. **Warning! Only use the power adapter provided with the simulator for charging otherwise internal damage may occur.**

Ensure that both the charger and simulator are turned OFF before connecting. Plug the charger connector into the socket in the base of the simulator. Turn ON the charger. Charging is in two stages:

Stage 1 – Fast charge mode

Thismode covers both constant current and constant voltage modes and charges the battery to approximately 85% of its capacity in approximately 3 hours. In this mode the charge indicator will be flashing green. Once 85% capacity has been achieved, the charging will automatically switch into "Stage 2".

<u>Stage 2 – Trickle Charge Mode</u>

This mode will deliver sufficient charge to top off the battery to 100% of its capacity in approximately 45 minutes. In this mode the charge indicator will be a solid green. Once 100% capacity has been achieved the charge indicator will extinguish.

In the event of a fault with the battery charging circuit, or the battery pack itself, the charge indicator will turn red. In this event, please contact your local representative to arrange for the repair of the simulator.

The charging times are approximate and will vary depending on initial battery charge state and temperature. Also, if the simulator is turned on while being charged, the power from the charger will be shared between operation and charging with the priority given to operation.

To conserve battery life it is recommended that once the battery is fully charged, the charger is disconnected.

5.0 Calibration, maintenance and repair

5.1.   Calibration

Calibration of the simulator can be performed without the need to disassemble the unit. A single adjustment made using the key pad is all that is required to perform the calibration. The calibration function is password protected to ensure that unauthorized or inadvertent changes cannot be made. Following a successful calibration, the date is automatically logged within the internal memory and available to view in the "ABOUT" screen.

The calibration password is located on the rear of the sleeve containing the utility software CD. The password is set at the time of manufacture and is unique to each simulator. If the password is lost or forgotten, the local sales representative will be able to reissue it.

5.1.1. Equipment requirements

- Laboratory standard AC voltmeter/DMM
- Oscilloscope

5.1.2. Preliminary instructions

- Allow 30 minutes for the test equipment to temperature stabilize before performing this procedure.
- Connect the AC voltmeter/DMM and oscilloscope to the mV/IEPE BNC output socket.
- Locate the calibration password.
- Ensure that the simulator battery is fully charged.
- Turn on the simulator and allow 5 minutes to stabilize before making any adjustments.
- Ensure the mV/IEPE socket is set for mV – see paragraph 4.11.

5.1.3. Procedure

Edit the default profile for:

Frequency:	100Hz
Sens:	10.000
g Level:	100.000
Type:	Sinusoidal

Press the *TOOLS* menu key. Using the down arrow to move to "CONFIGURATION".Press the *ENTER* key. Using the down arrow step down the menu until "Calibration" is highlighted. Press the *ENTER* key.
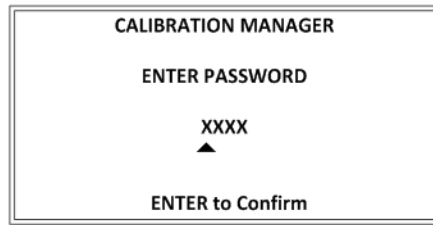
The calibration manager screen is displayed.

Figure 25: Calibration manager screen

Using the arrow keys, input the calibration password supplied. Press the *ENTER* key. The message "ACCEPTED" will be briefly shown if the password input is correct and the "ADJUST LEVEL" screen is then displayed. If the password is incorrect the message "REJECTED" will be shown.
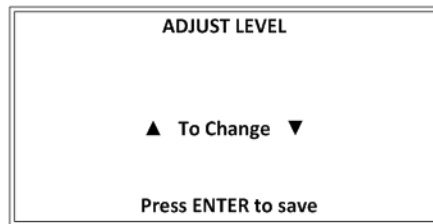

Figure 26: Adjust level screen

Adjustment 1: Using the up and down arrows, adjust the mV output for a reading on the DMM of 707.0 mV rms, or as close as possible. Press the *ENTER*key .The display will return to the edit screen.

Measurement 1: Change the g level setting to 10.000. The DMM reading should be within the range 70.00 to 71.41 mV rms.

Measurement 2: Change the g level setting to 1000.0. The DMM reading should be within the range 7.000 to 7.141 V rms.

If the values measured are not within the ranges stated then repeat the "Adjustment 1" step, setting the output to a level whereby the values measured and recorded in Measurements 1 and 2 come within range. Note: the value set in the "Adjustment 1" step must remain within the range 700.0 to 714.1 mV rms for the calibration to be valid.

When all values noted are within range, the simulator is calibrated and the calibration date will be stored. To verify, return to the "TOOLS" menu and select "ABOUT". The "Last Cal" date will now have been updated. If the simulator cannot be adjusted so that all measurements are within range, it should be considered faulty and returned for repair.

5.2. Maintenance

The simulator is designed to provide long service with little in the way of maintenance being required over the course of its lifetime. Items that may require replacement periodically are:

- The internal lithium Ion battery pack - which will deteriorate as a function of time and usage.
- The front panel keypad

It is recommended the replacement of both the battery pack and key pad after approximately 3 years or in the case of the battery pack 300 charging cycles, whichever is sooner.

5.3. Repair

In the event that the simulator requires repair please contact your local Sales Representative who will advise on the returns procedure.

6.0 Utility software

6.1. Introduction

The utility software provides greater flexibility when creating, storing and using simulation profiles. In addition, it provides a method for downloading from a PC the specific profiles that may be required at any one time.

Further benefits of the software to the user are:

- The creation of up to 40 simulation profiles within the framework of a single profile set which are then stored in a dedicated folder on the PC. Multiple profile sets can be generated and stored in this manner.
- Create, name and save new profile sets from existing profile sets.
- Select specific profiles within a profile set for download.
- Generate a customized description for each profile. This replaces the automatic "User Profile X" name allocated when a profile is created locally on the simulator.
- Create a note against each profile (the profile note is only visible in the utility software).
- View the input limitations of each parameter – reference the "Fixed Outer limits" field.

The utility software provided may be loaded onto a single PC or multiple PCs allowing users to create their own personalized simulation libraries. Data transfer is in one direction only – from the PC to the simulator, which provides security against inadvertently overwriting stored user profiles on the PC.

6.2. Installing the utility software

The PC should meet the following minimum specifications:
- 1 GB available hard disk space
- DVD drive
- SVGA (880 x 600) or higher resolution monitor
- 1 GHz Pentium® IV processor (or equivalent) for Windows XP
- 1 GB MB system memory (1 GB recommended for windows XP)
- 1.8GHz Pentium IV processor for Windows Vista
- 1GB system memory for Windows Vista
- USB configuration COMs ports
- 1.8 GHz Pentium IV processor for Windows 7

Operating systems:
- Windows® XP SP3 (32 bit only)
- Windows Vista® SP1 (32 bit and 64 bit)
- Windows® 7 and Windows® 8 (32 bit and 64 bit)

The utility software is installed on to a PC as follows:

Connect the simulator to the PC using the supplied USB cable. Turn ON the simulator and wait for the PC to install the device driver. It is recommended that all programs running on the PC are closed prior to loading the utility software.

NOTE: It is very important to connect the simulator to the PC prior to installation of the software. The software installation may fail if this step is not completed first.

Insert the utility software CD. The CD should "auto run" and the setup wizard should appear. If the CD fails to run, type "Run (Drive):\4830B Simulator Utility Setup Vxxx".exe (insert version number) into the search window in the start menu and press return.

If using Windows 7, locate the 4830B SimulatorUtility Setup Vxxx application file on the CD / DVD drive using windows explorer. Double click on the file to start the installation. A drop down menu will appear. Double click on "Run as administrator". The software installation process will now begin.

Follow the prompts provided by the set up wizard to load the software. Users are given the option to include a program shortcut on their desktop. A restart of the PC may be required (depending on operating system) to complete the installation.   The program is identified by the name "4830B Simulator".

6.3.   Opening and running the utility

Double click on the desktop shortcut icon or the icon in the start menu to open the utility.
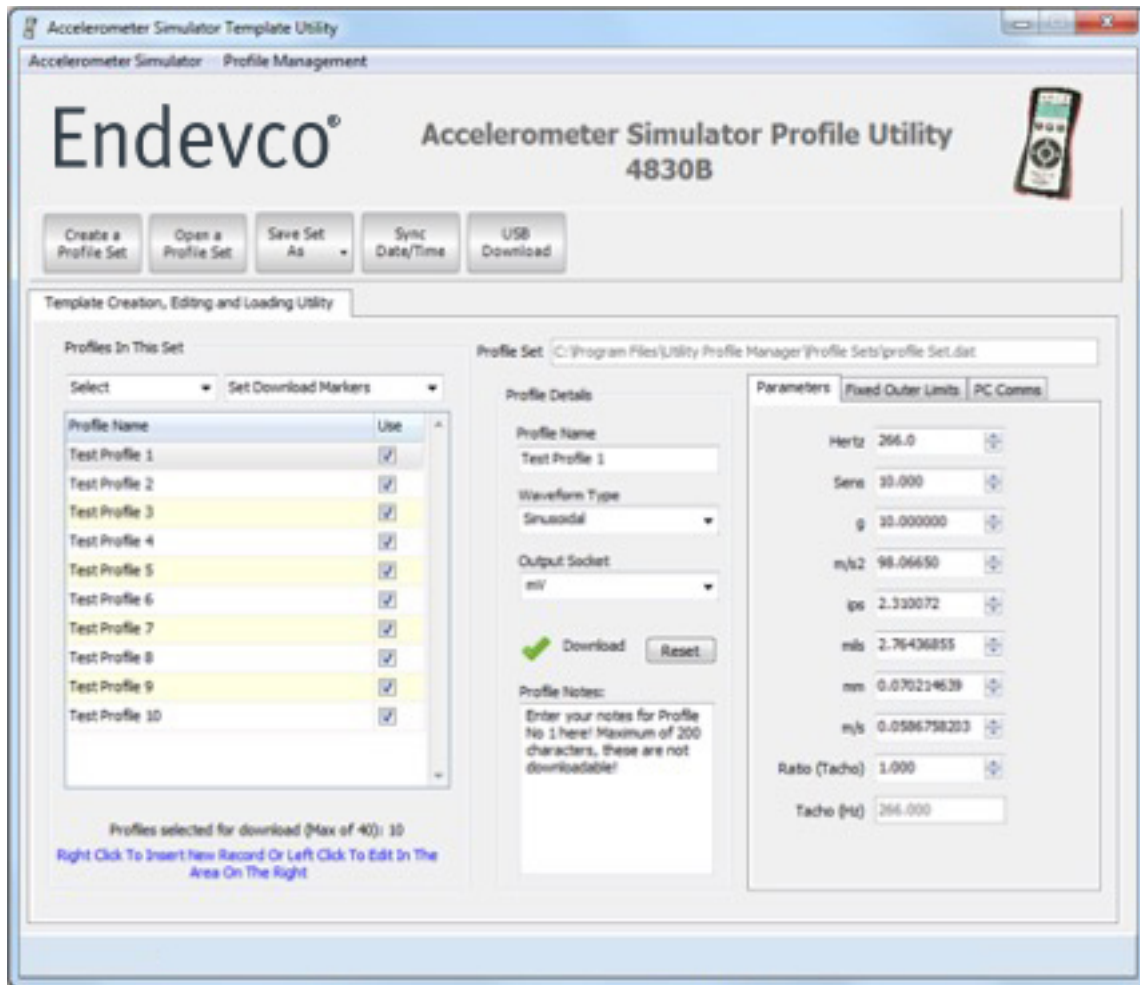Once the utility has opened the following screen should be seen.

Figure 27: Utility software main screen

Note that a set of 10 profiles are pre-loaded into the table. These have been loaded as part of the installer as working examples and are stored in the path shown in the profile set dialogue box. Take time to familiarize yourself with how they are constructed. If "Test Profile 1" is not highlighted, click on it using the mouse. Use the up and down keyboard keys to scroll through the list. Moving through the list, it can be seen that the profile name, waveform type, profile notes and the parameters change from profile to profile.

6.3.1. Creating and saving profiles / profile sets

The utility installer will create a "Profile Sets" folder in the directory: C:\Program Files\Utility Profile Manager\. Unless otherwise directed, profile sets will be stored in this directory. A profile cannot be created and saved singularly - it has to be a member of a profile set. To create a profile, first create a profile set. A profile set can contain between 1 and 40 individual profiles. To create a profile set click on the "Create a Profile Set" button. The "CreateProfilesForm" window will appear.
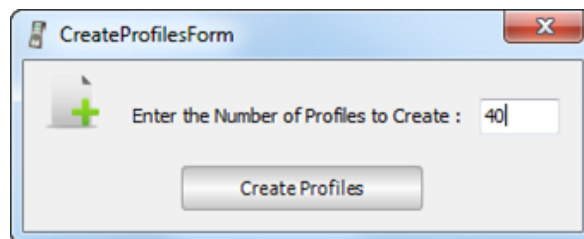

Figure 28: Create profiles form

Enter the number of profiles required to make up the profile set. Click the "Create Profiles" button to generate the base template. A new window will open. Give the profile set an identification name and save to the profile sets folder. A message then appears confirming that the profiles are ready to use. The name and location of the new profile set is now displayed in the "Profile Set" window.
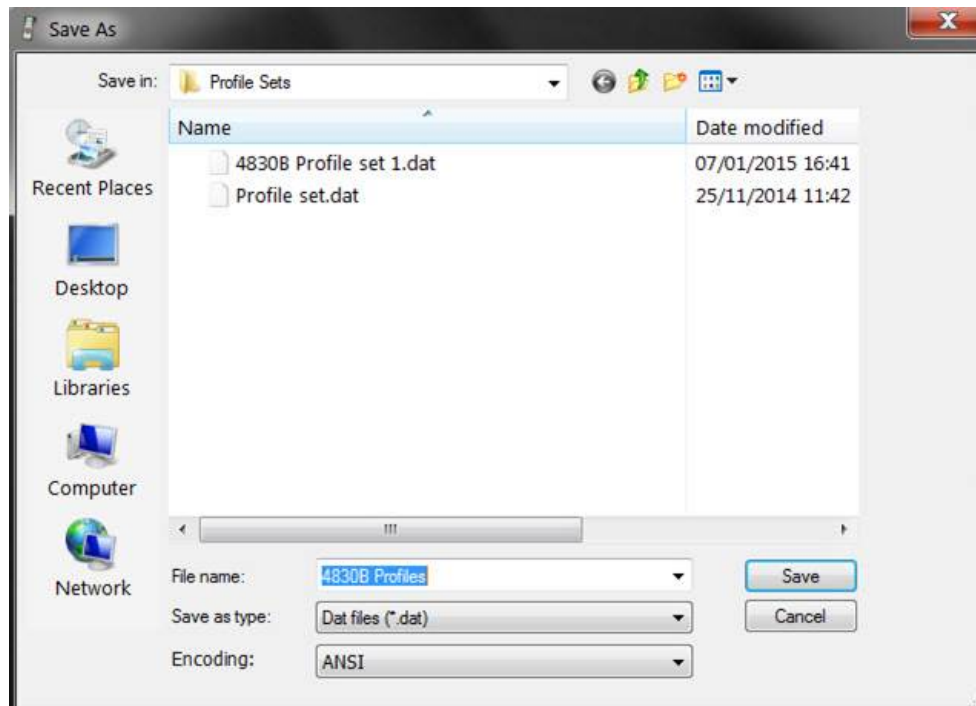

Figure 29: Profile set save screen

6.3.2. Editing a profile

All new profiles are created using the parameters defined in the simulator default profile – seeparagraph 3.4.1. The user is now free to modify the parameters and rename each profile as required. To access and view each profile parameter, simply click on the profile name in the list. Fields are then accessed either by the keyboard "Tab Key" or by clicking on to them using the mouse button.

6.3.2.1. Editing a profile name

Enter the new name for the profile into the "Profile Name" box, keeping it to a maximum of 17 characters in length. Pressing the "Update Profile" button will change the profile name in the list.

Once downloaded to the simulator, this profile name will be shown in the list of available profiles.

6.3.2.2. Selecting thewaveform type

Select the waveform type from the pull-down menu and press the "Update Profile" button. This is specific to the individual profile.

6.3.2.3. Output socket select

Select the output socket function (refer to paragraph 4.11 for details) from the pull-down menu. This function is specific to a profile set, not an individual profile, i.e. all profiles within the set will be changed. A message box is displayed warning of the change.

Figure 30: Output socket select warning screen

6.3.2.4. Editing a parameter

All parameter values can be edited either by highlighting with the mouse and overtyping, using the increase or decrease arrow keys at the side of the parameter field or the up and down arrow keys on the keyboard. Save the changes made to the parameter by clicking on the "Update Profile" button.

If the parameter value entered is outside predefined limits, the value will be highlighted red and a warning message will be shown. The value should then be edited until it is within acceptable limits. The predefined limits can be viewed by clicking on the "Fixed Outer Limits" tab.
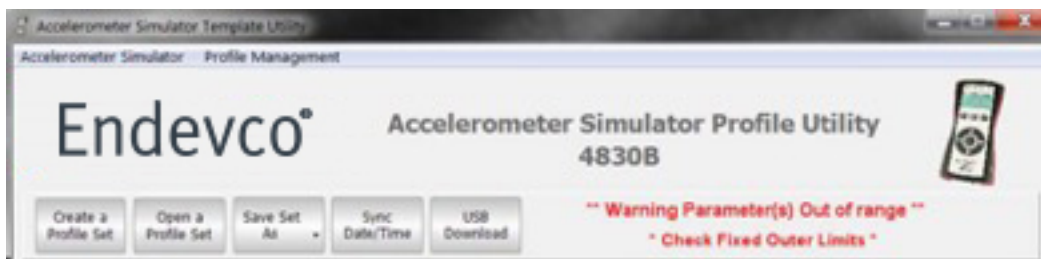

Figure 31: Parameter out of range screen

The three primary vibration parameters, Hertz, Sens and g are values that are required to be entered. The remaining secondary vibration parameters are calculated values and will change whenever the frequency or g level values are edited (refer to paragraph 4.2.1 for details of the relationships). Similarly, the tacho (Hz) value is non editable and will change whenever the ratio (tacho) value is changed.

The secondary parameters can themselves be edited as described above, and whenever a change in value is made the value of g will change accordingly (refer to paragraph 4.2.1 for details).

6.3.2.5. Profile notes

These are specific to each individual profile. Enter up to a maximum of 200 characters in the box provided. The notes are not downloaded to the simulator and are only available to view within the utility software.

6.3.2.6. Selecting a profile for use

A profile set may contain anywhere between 1 and 40 individual profiles. Not all of the profiles within a set may be required at any one time. A single profile or a portion of the profiles within a set can be selected for download to the simulator simply by checking the "USE" box alongside the profile name in the list.

All profiles within a set can be selected or deselected for download from the "Set Download Markers" pull-down menu. When selected a green tick appears above the profile notes box, if not then a red cross is shown.

6.3.2.7. Reset button

Provides a quick way to reset the profile parameters to default. In addition, the profile name is blanked.

6.3.3. Opening a profile set

Press the "Open Profile Set" button to select an existing profile set. The default path is C:\Program Files\Utility Profile Manager\. Select the required file and open. The profiles within the set will now be imported in to the list.

6.3.4. Saving a profile set

A profile set can be saved in three ways. Select using the "Save Set as" pull down menu.
- Save set with all data – profile name and parameter values will be saved – useful for making a direct copy of a known profile set.
- Save select lines as a new set – saves only the profiles selected into a new set.
- Save as a new blank set – will be saved as a set containing the same amount of profiles all with the same default parameters values.

6.3.5. Adding a profile

To add a profile to an existing profile set, right click with the mouse on the profile list. A new profile will be added to the end.

6.3.6. Delete last profile

Select from the pull down menu, above the profile list, "Delete Last Profile". A confirmation message will be displayed, click OK to delete the last profile.

6.3.7. Communicating with the simulator

At the time of installation, the device driver would have allocated a USB port number to the simulator. Note: this will not be port 1. Whenever the simulator is connected to the host PC, the same port number will be used.

A simple way to verify the port number allocated to the simulator is to view the Windows Device Manager. To open the device manager (in Windows XP, Vista, and 7)
- Open the run command window by pressing and holding the Windows key, and then press the R key
- In the run command window, type devmgmt.msc

Once the Device Manager is open, COM port allocationscan be viewed under the Ports (COM & LPT) heading. Connect the simulator to the host PC using the supplied USB cable. A new COM port will appear, which is the port allocated to the simulator. In the example ofFigure 32, COM5 is the port allocated to the 4830B simulator.
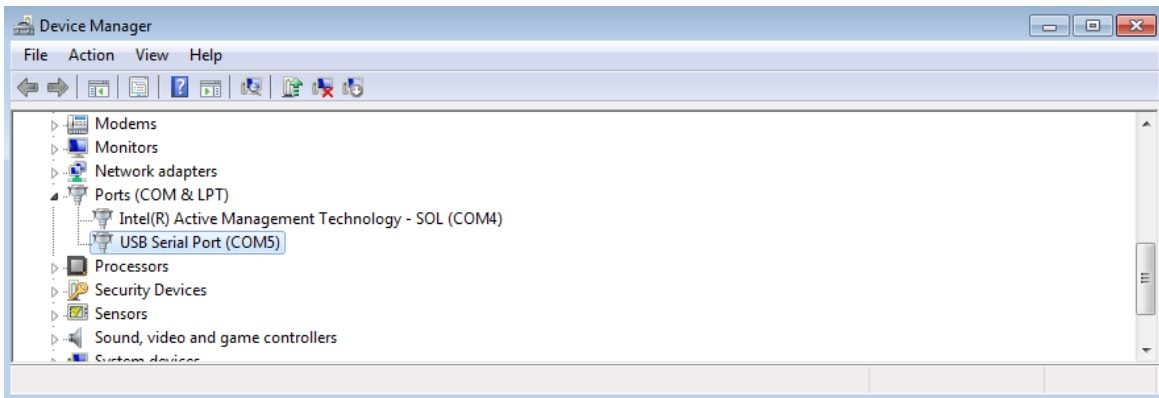
Figure 32: Device Manger

With the utility software open, click on the "PC Comms" tab. Select the allocated port number from the pull down menu.

6.3.7.1. Download profiles

Open a profile set and ensure that some or all of the profiles are selected for use. Connect the simulator to the host PC using the supplied USB cable. Select the USB port as in 6.3.7 above.

Select "DOWNLOAD DATA" from the tools menu on the simulator.
Press the USB Download button on the utility software screen.

The message "Setting Up Default Profile" will be displayed followed by a download status bar.On the simulator the display will show "Receiving USB data".

On completion of the download, the Utility will display the message "Profile(s) Downloaded Successfully" and the simulator will show the message "Data Received Safely".

The selected profiles are now stored in the simulator's internal memory and can be viewed and loaded in the profiles menu.

6.3.7.2. Clock synchronization

The simulator real time clock can be synchronized with the host PC clock. This is best achieved at the same time when profiles are to be downloaded. Otherwise, connect the simulator to the host PC using the supplied USB cable. Select the USB port as in 6.3.7 above. Select "DOWNLOAD DATA" from the tools menu on the simulator.

Press the "Sync Date/Time" button on the utility software.

The message "Downloading Clock data" and a status bar will be shown on the utility software.On completion the simulator will show the message "Clock Updated Safely".

6.3.7.3. Firmware upgrade

Should it be necessary to upgrade the simulator firmware, the upgrade will be handled using the Utility software. Full details on how to perform the upgrade will be issued at the time an upgrade is needed.

7.0 Accessories

Part Number	Description	
QSG4830B	Quick start guide	Included
IM4830B	Instruction manual	Included on CD
-	Utility software	Included on CD
EP316	Twinax BNC Plug	Included
EP695	10-32 to BNC Adaptor	Included
EHM2107	Universal power supply, supplied with adaptors for USA, UK, EURO, JAPAN, and Australia	Included
EHM2108	Soft carrying case with cable pouch and shoulder strap	Included
EW1400	USB interface cable (mini B to USB)	Included
43664-XXX	Differential Cable Assembly Adaptor (2 Pin 7/27-17 to Twinax BNC). –XXX defines cable length	Optional
43655-XXX	Triaxial Cable Assembly Adaptor (Female 4 pin to 3x male BNC). –XXX defines cable length	Optional

8.0 FAQ (Frequently Asked Questions)

Question

Can I charge the battery of the 4830B through it's USB port by connecting it to my computer?

Answer

No. The 4830B battery can only be charged by connecting the included EHM2017 power supply to the charger input socket.

Question

I have a large number of channels to simulate. How many channels of signal conditioning/DAQ can be driven at any one time with the 4830B?

Answer

For the charge outputs (SE & DIFF) it would be dependent on the input impedance of the particular signal conditioner as multiple conditioners would reduce the effective impedance of the input. They would be in parallel, so the more added would lower the impedance becomes and eventually it will load the charge output of the simulator, just as it would an accelerometer. There is also the practical considerations of feeding one charge source to multiple inputs whilst maintaining sufficient noise immunity / rejection.

The IEPE output is designed to sink the constant current from the signal conditioner in order to set the correct operating bias, i.e. as an accelerometer would do. Connecting to multiple IEPE signal conditioner inputs is not a practice that should be undertaken as damage to the unit and or the signal conditioner may occur.   The connection of a single IEPE type accelerometer to multiple signal conditioners is not something that would be done in practice.

The mV and Tach outputs are a single ended low impedance outputs and are capable of driving multiple signal conditioners. The exact number is again dependent on the loading presented by the type of voltage input conditioner (input impedance).

To summarize, the 4830Bis only designed to simulate a single accelerometer and therefore the output is designed for input into just one channel of a signal conditioner at a time. It is not recommended to"split" the signal across multiple inputs as the unit is unlikely to perform within published specifications and worst case could be damaged.

Question

I've been unable to find the setting to tell the 4830B which output should be active(mV/IEPE, TACH, SE PE, DIFF PE). Where can I set that?

Answer

The 4830B outputs are active across all outputs (mV/IEPE, TACH, SE PE, DIFF PE) simultaneously. Therefore, the user does not need to "activate" a particular output.