


Cambridge  *Neurotechnology Ltd*

Actiwatch-Score
ACTIVITY MONITORING SYSTEM

User Manual

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Document Control Information

Document reference number 30021

Revision 5.03

Issue Date 21/06/06

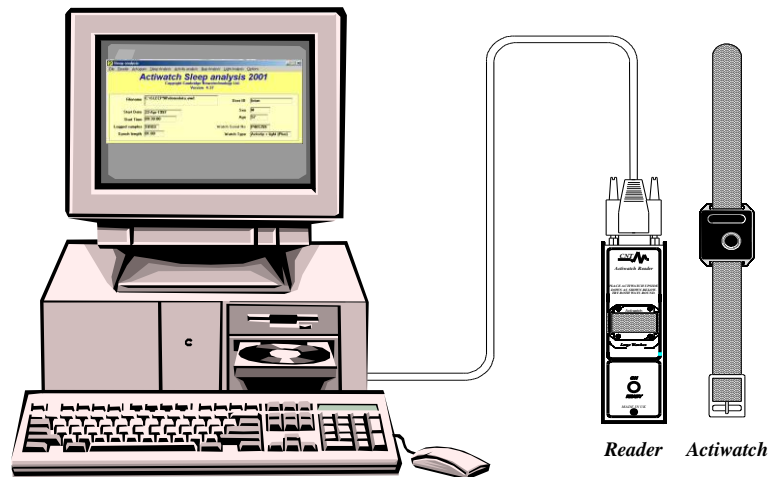
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1.00- Introduction To The Actiwatch System

1.01: Overview;

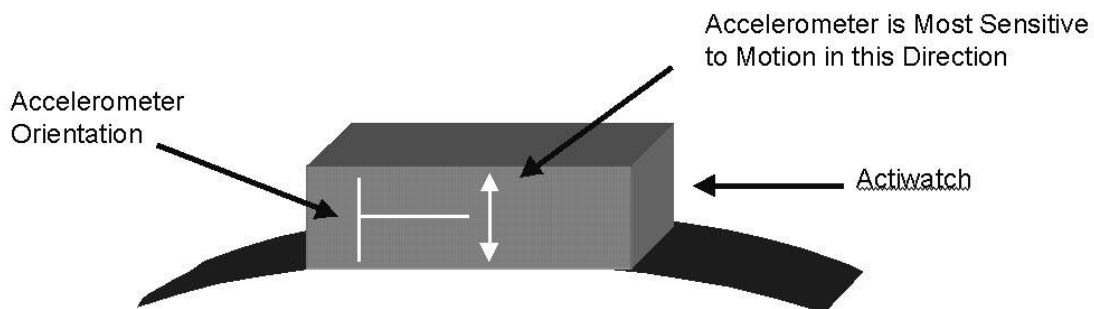
The Actiwatch-Score is a compact, light weight, wrist worn electronic device that measures and records physical movement. The data may be transferred telemetrically (i.e. no connection to the watch) and analysed using the Score Analysis or Sleep Analysis software package. The Actiwatch-Score has two 7-segment LED displays that show prompts and allow score entry (see section 1.03). There are three parts to the Actiwatch Activity Monitoring System:

- Actiwatch
- Reader/Interface and connecting cable
- Software running on PC



1.02: How does it work;

Activity is measured by the means of a piezo-electric accelerometer that is set up to record the integration of intensity, amount and duration of movement in all directions. The corresponding voltage produced is converted and stored as an activity count in the memory unit of the Actiwatch. The maximum sampling frequency is 32Hz. It is important to realise that due to this improved way of recording activity data there is no need for sensitivity settings as the Actiwatch unit will record all movement over 0.05g. Filters are set to 3 to 11 Hz.



1.03: The Actiwatch-Score Functionality;

The Actiwatch-Score continuously records physical activity but also allows the wearer to subjectively score a set of pre-programmed parameters (e.g. Pain, Mood etc). The Actiwatch-Score allows up to 8 parameters to be scored in any session and the sessions may be programmed to occur at a particular frequency (i.e. half-hourly, hourly etc) and/or may be manually instigated. Programmable prompts are shown on the LED display to remind the user of the parameter that is to be scored. The range of scores is also programmable over the range 0 to 15. These multiple scores may then be analysed and reported or exported using the Score Analysis or Sleep Analysis Software.

1.04: Sensor Calibration and Reproducibility;

All Actiwatch units are calibrated thoroughly on a specially designed rig before they leave CNT. The Actiwatch incorporates a calibration factor to produce the same output for the same amount of motion (in terms of g). In practice, inherent variation in application of Actiwatch units means that no two Actiwatch units will produce exactly the same output. To minimise this difference it is important to develop a standardised Actiwatch mounting and positioning protocol.

1.05: Time Keeping;

The Actiwatch time is set by the PC clock and elapsed time is marked in each unit by means of a crystal that oscillates 32 times a second. Selecting a sampling epoch sends an instruction to wait a certain number of oscillations before storing the number of activity counts. This system is also used when any delays in starting of recording are set.

1.06: Waterproof Case;

The Actiwatch-Score casing is designed to be waterproof. This is achieved by use of rubber 'O' rings surrounding the battery compartment. It is important that this 'O' ring remains intact when the back is removed for battery replacement. In older models (pre July 1997) the 'O' ring is separate to the back plate and care should be taken to ensure of its correct positioning when replacing the back plate.

1.07: Actiwatch Strap;

Each Actiwatch-Score is supplied with a nylon strap that should be big enough to fit all wrists. Straps can be interconnected if the Actiwatch is going to be worn on locations other than the wrist. Velcro straps can be supplied (at extra cost) if required.

2.00- Installing The Software And Reader

2.01: System Requirements;

The basic requirements for the host PC are listed below:

- IBM Compatible PC
- Windows 2000, NT or XP operating system
- 100 MB Hard Disk space
- 9 or 25 pin RS-232 Port (Adapters are available if needed)
- A CD-ROM drive.
- SVGA Graphics (800 x 600 pixels minimum)
- Printer (if hard copy output is required)

In general, a faster processor will provide superior performance.

2.02: Actiwatch Software Installation;

Actiwatch software is needed to set up and download Actiwatch units as well as for data analysis. The Actiwatch-Score may be used with the Actiwatch-Score Analysis Software or the Actiwatch Sleep Analysis Software. The latter provides advanced sleep analysis functionality in addition to the functions offered by the Score Software. The installation procedure for both packages is the same and is detailed below.

Windows Installation:

- Insert the supplied CD-ROM into your CD ROM drive (typically D: or E:)
- Click on the 'Start' button and select 'Run...' from the menu.
- Type `d:\setup` (or `e:\setup` depending on drive) in the 'Open' field and click 'OK'.
- Follow the on screen instructions to complete the set-up.
- In the set-up window that appears you can edit the destination drive and folder for the software if you wish.
- Run the software from the Start menu 'programs' list.

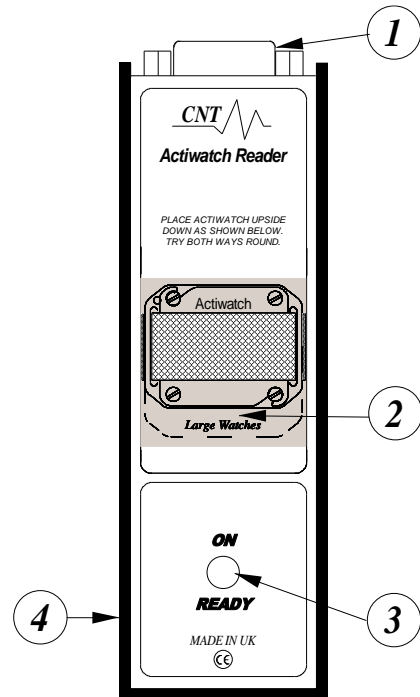
Ensure no other Windows applications are running when installing the software.

When upgrading from a previous version of the Sleep Analysis or Rhythm Analysis software, it is recommended that a new folder be created for the new version. Remember to change any shortcuts that may point to the old version.

2.03: The Actiwatch Reader;

The Actiwatch Reader uses a standard 9 pin 'D' type serial cable (supplied) for communication with the PC and also to receive power from the PC. If you only have a 25 pin COM port available, a 9 pin to 25-pin adapter can be supplied on request. Please note that if the power of the PC is insufficient to run the Reader (a possibility when using a portable PC from battery power) then we can supply a power pack that fits into the side of the Reader. This pack utilizes rechargeable battery, which must be recharged using a mains adapter (not supplied) when depleted.

- 1) **Serial Port Connection:** 9-way 'D' female.
- 2) **Communications region:** Invert the Actiwatch over this region to send or read data.
- 3) **Status LED:** Illuminated GREEN when power applied (ON), and RED when Actiwatch is located correctly for data communication (READY). *Note: The status LED on older versions of the reader does not illuminate green.*
- 4) **Power Pack Connector.**



To install the Reader:

- Plug the male end of the cable into the Reader.
- Plug the other end of the cable into the serial (COM) port to be used.
- Note the COM port (usually 1 or 2) that you have used.

The reader has a Bi-coloured LED that will be illuminated green when power is correctly applied, this may not occur until the Sleep Analysis software is run.

Checking for Interrupt Request Conflicts:

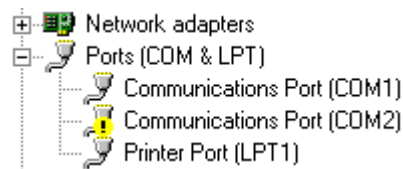
If your computer contains a network card or any other parallel interface card, it is possible for Interrupt Request Line (IRQ) conflicts to exist between the COM ports and the installed card.

If an installed card requires the same interrupt request line as the COM port, the COM port may function intermittently or not at all. The user's manual that accompanies the card will have instructions for changing the IRQ setting. COM port IRQ settings cannot be changed.

Typically IRQ 3 and 4 are required for COM 1 and 2 respectively. Unfortunately, some cards are installed with these IRQ settings. The only solution is to change the IRQ setting for the installed card. Newer “plug & play” versions do not cause this problem, because the operating system can shift the IRQ setting to avoid conflicts.

To check for interrupt request conflicts:

- Right Click on “My Computer”.
- Select ‘Properties’ from the pop-up menu.
- Select the ‘Device Manager’ tab.
- A conflict is indicated when a yellow circle containing an exclamation mark is found next to the COM port (see below).



- It will be necessary to change the IRQ setting on the hardware card for the COM port to function properly.

3.00- Setting Up and Using the Actiwatch

3.01: Actiwatch Set-up;

With the Reader connected to your PC, run the Score Analysis or Sleep Analysis software as described in the previous section. A screen similar to that shown below will be displayed;



Filename		C:\Program Files\Actiwatch sleep 2001 (beta)\ScoreMKIIdemo.AWD	
Start Date	23-Jan-2003	User ID	ScoreMKIIdemo
Start Time	17:53:00	Age	57
		Sex	M
Logged samples	32128	Watch Serial No	N72FFFF
Epoch length	00.25 Mins	Watch Type	Activity + score

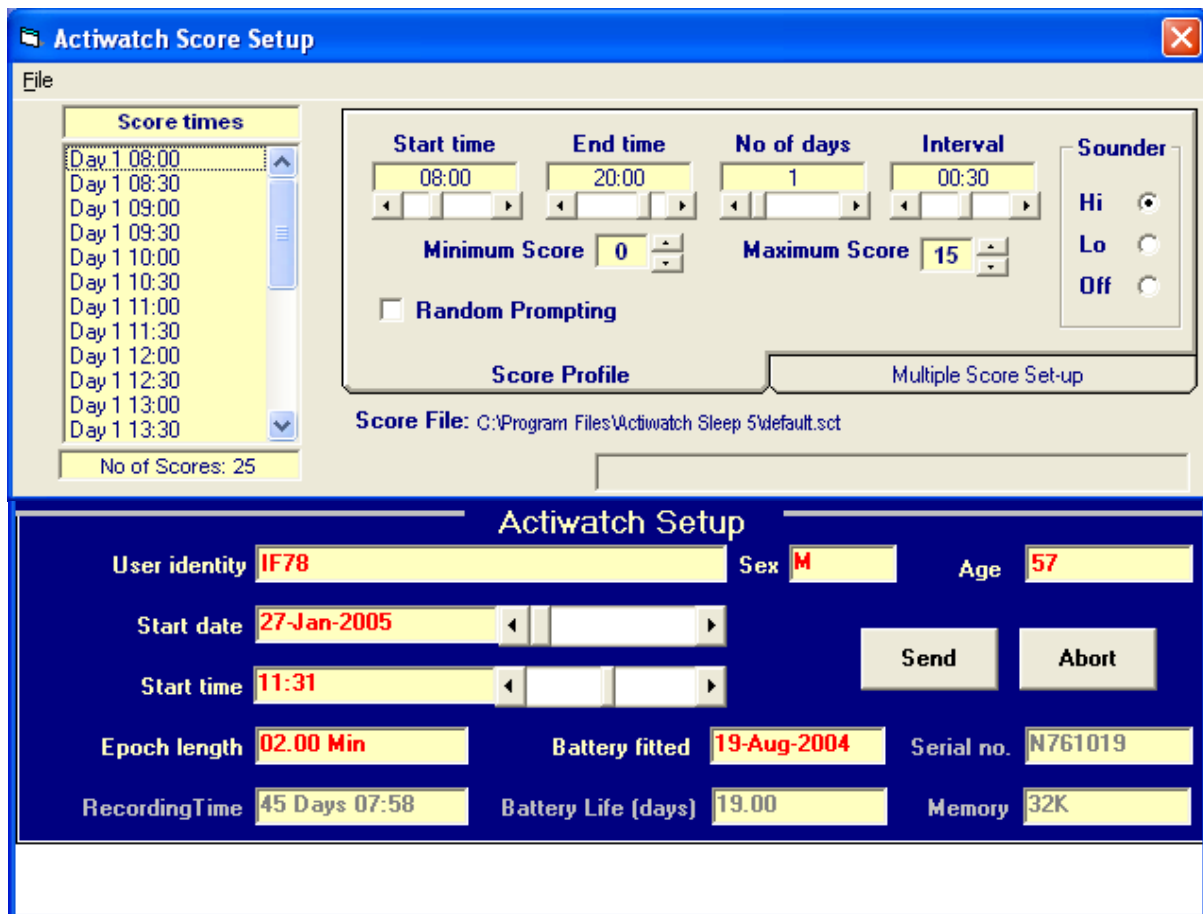
This screen contains information for the *most recently loaded* data file. Unless you have loaded another during the current session the default demonstration file will appear.

3.02: Communicating With The Actiwatch;

- Place the Actiwatch, plastic lid side downwards so you can see the ID number on the steel base, on the grey shaded part of the Reader.
- Make sure it is correctly aligned, with the small hole in the top left of the Actiwatch base being aligned with the top left of the grey shaded part of the Reader (indicated by a black dot).
- Adjust the Actiwatch position by gently sliding it along the Reader until the LED is illuminated RED, indicating 'ready'.
- If the LED is not illuminated, check the COM port by selecting 'Reader' then 'Comms' from the Sleep Analysis software.
- Repeat the above operation with another COM port selected.
- Your mouse may be using COM1 hence select COM2 for the Reader.
- If you do not get the 'READY' light with any COM port selection please check the connections and that there are no communication conflicts.
- Remove the Actiwatch from the Reader when not reading or writing data.
- **It is possible to perform tests on the Actiwatch and reader, see Appendix A.**

3.03: Setting-up the Actiwatch-Score;

With the Actiwatch-Score placed on the Reader such that the 'Ready' lamp is lit, select 'Write' from the 'Reader' menu of the Analysis software. The current settings will be read from the Actiwatch and a screen similar to that shown below will be displayed.



The Actiwatch Score Setup screen is divided into two halves; the upper half pertains to the Score specific settings, the lower half pertains to the user information and Activity recording.

Setting Score Times (Sessions)

In the upper half of the set-up screen, select the 'Score Profile' tab (as shown above). The following settings may be adjusted:

- **Start time** – The time that you wish the first session to occur each day.
- **End time** – The time that you wish the last session to occur each day.
- **No of days** – The number of days over which you wish to obtain scores.
- **Interval** – The frequency of occurrence of sessions (1min 2min 5min 10min 30min 1Hr 2Hr 3Hr)
- **Minimum Score** – The lowest score that may be entered (typically 0)
- **Maximum Score** – The highest score that may be entered (maximum allowed is 15)
- **Random Score** – Allows the user to select random score prompting within the selected interval
- **Sounder Volume**-Off, Lo,Hi

A list of Score times is shown to the left of the display; this shows the time of occurrence of every session according to the settings made above. The total number of scores (sessions) is also shown (**Note that this value includes times prior to the setup on the current day**).

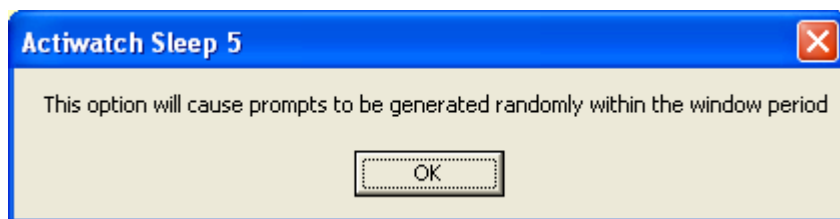
Example

If the start time is set to 10:00 and the end time is set to 20:00 with the number of days set to 3 and an interval of 1 Hour then the Actiwatch-Score will prompt the user to input Scores every hour starting at 10:00am each day and finishing at 8:00pm each day. Note that Day1 is the present day hence score times set before the present time are missed.

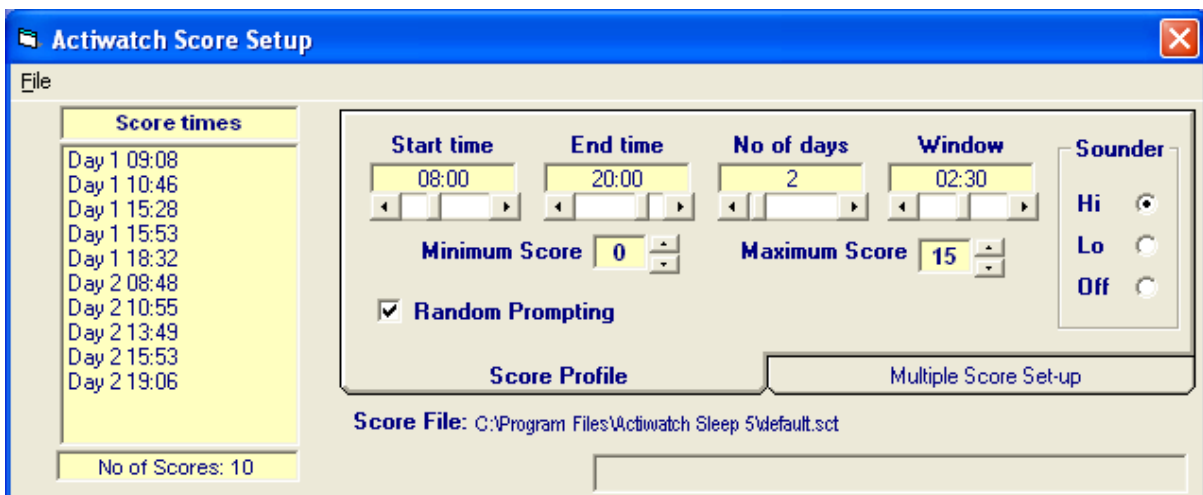
If the Minimum Score is set to 1 and the Maximum Score is set to 5 then the user will only be allowed to enter scores within that range.

Example of Random Score prompting

If the ‘Random Score’ button is ticked, the following screen will appear:

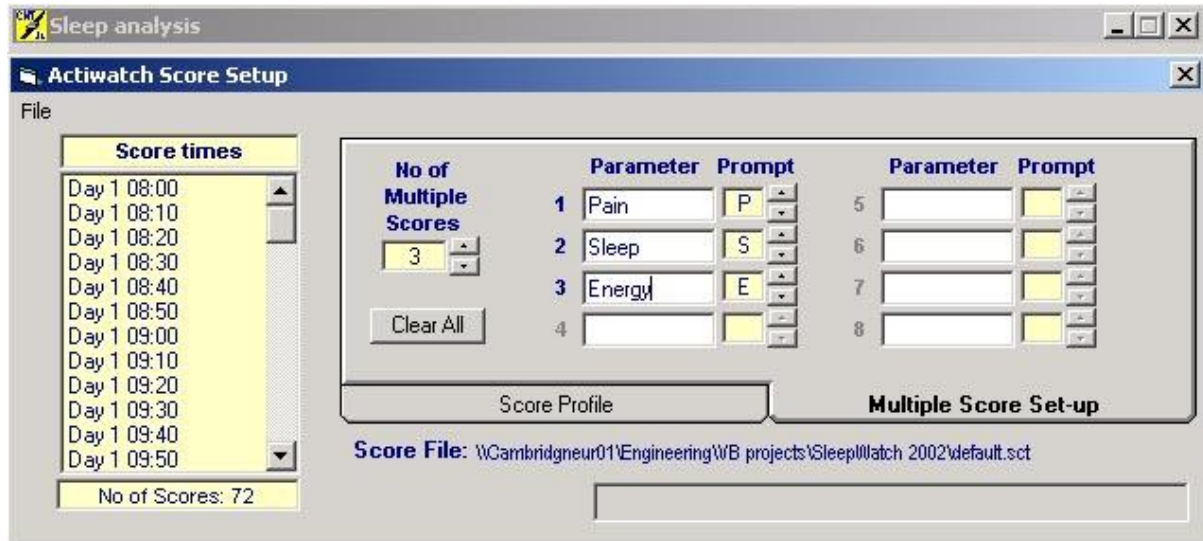


Selecting OK will allow the user to input a window period of between 30 minutes and 5 hours. The software will then randomly generate 1 score prompt in each window period. The score prompts will not however be within 15 minutes of each other. An example of a random score setup window is as follows:



Multiple Score Settings

In the upper half of the setup screen, click on the ‘Multiple Score Set-up’ tab, the display will be similar to that shown below;



It is possible to set-up a session for single score input (0 multiple scores) or multiple score input with up to eight parameters. If no multiple scores are set, the Actiwatch display will prompt the user for a single score by showing two horizontal bars ‘- -’ on the LED display. If multiple score are programmed, every session will prompt for up to eight scores and the LED display will show the programmed prompt for each score. As the user enters the score, each score is saved and the next score parameter is prompted. This continues until all parameters have been scored. The Multiple score set-up has the following controls;

- **Clear All button** – Clear all the parameters and prompts before making changes.
- **No of Multiple Scores** – Select how many parameters you wish to score in each session.
- **Parameter** – A name for each parameter that you wish to score (8 characters max).
- **Prompt** – This is the digit that will be shown on the LED display to prompt the user to score the parameter. This acts as a reminder to the user of the parameter being scored and should typically be set to the first letter of the Parameter name (e.g. ‘Pain’ has prompt ‘P’).

There are 16 possible characters that may be chosen and it is not possible to use the same character for more than one parameter.

Example

If the score times are set as in the previous example with the parameters and prompts set as shown in the figure above (i.e. Pain P; Sleep S; Energy E) then the user will be prompted hourly between the start time and end time each day to enter multiple scores. The multiple score session will begin by prompting the user to enter the first score. The first prompt character will be shown on the LED display (in this case ‘P’) indicating to the user to enter a score for their level of Pain. After five seconds, the score will be saved and the display will show ‘S’ indicating to the user to score their Sleepiness. Again, after five seconds the score will be stored and the display will show ‘E’, indicating to the user to score their energy level.

When all scores have been entered, the session is complete and the displays will be blank.

Note: If multiple scores are used with a one-minute interval, it is possible that the user could take longer than one minute to enter all scores. In this case, the prompting for the next session will start immediately following the last entry of the previous session. It is advised to limit the number of multi scores to two or three when using a 1-minute interval to avoid this problem.

The User and Activity settings

The lower part of the Actiwatch Setup screen has the following user defined settings;

- **User Identity** – Enter a user ID of up to 20 characters making sure not to use the return key, tab, dashes, commas or alike as these are delimiting characters and will prevent the set up being carried out properly.
- **Sex** – Use the mouse and click in this field to toggle between Male (M) and Female (F).
- **Age** – Use the mouse to highlight the age and type in the correct age.
- **Start Date and Start Time** – These are the current date and time of your PC. You can set the Actiwatch to start recording up to 7 days later by using the scroll bars in these fields to set a Start date and time in the future.
- **Epoch Length** – This refers to the period of time over which the Actiwatch will accumulate activity before saving the sample and resetting the counter to zero. You may select the epoch length you wish from a choice of 0.25 (15 seconds), 0.5 (30 seconds), 1, 2, 5, 10 or 15 minutes. As you select this you will see the field labelled *Recording Time* change. This will give you the maximum recording time (in days, hours and minutes) of the Actiwatch using the epoch length you have selected.

When a score interval of 1 minute, 2 minutes or 5 minutes is selected, it will not be possible to choose an epoch with a length exceeding the chosen interval. The following table shows a list of available epochs for any given interval:

<i>Interval (time between tests)</i>	<i>Available epochs</i>
1 min	0.25, 0.5, 1 minutes
2 min	0.25, 0.5, 1, 2 minutes
5 min	0.25, 0.5, 1, 2, 5 minutes
10 min	0.25, 0.5, 1, 2, 5, 10 minutes
15 min	0.25, 0.5, 1, 2, 5, 10, 15 minutes
30 min	0.25, 0.5, 1, 2, 5, 10, 15 minutes
1 hour	0.25, 0.5, 1, 2, 5, 10, 15 minutes
2 hours	0.25, 0.5, 1, 2, 5, 10, 15 minutes
3 hours	0.25, 0.5, 1, 2, 5, 10, 15 minutes
4 hours	0.25, 0.5, 1, 2, 5, 10, 15 minutes
5 hours	0.25, 0.5, 1, 2, 5, 10, 15 minutes
6 hours	0.25, 0.5, 1, 2, 5, 10, 15 minutes

It should be noted that only one scoring session will be allowed within any one epoch. If, for example, an epoch of 15 seconds is chosen, then the user may enter up to four sessions per minute (i.e. one per epoch). If however an epoch of 1 minute is chosen, the user may only enter 1 session in a 1 minute period. If the system has been set-up to prompt for scores every

minute (with a 1 minute epoch) the user will be unable to score manually in between prompted tests.

A zero activity value is logged in an epoch during a score test. If the interval is set to 1 minute, a shorter epoch (i.e. 15 seconds or 30 seconds) should be chosen to ensure that some activity data are logged.

- **Battery fitted date** – This shows the date the last battery was fitted and must be updated by you when you set up the Actiwatch following a battery change. Clicking in this field changes the date to the current PC date.
- **Life (days)** – This lets you know how much battery life is left in the Actiwatch unit in days.

The following information is also provided; however the user cannot change these:

- *Serial Number*: This is stored in the memory of the Actiwatch and should correspond with the label on the rear of the watch.
- *Memory*: This shows the amount of memory fitted to the Actiwatch (in Kbytes).

If you are not happy with any of the parameters which you have set you can go back and change them at any stage. Selecting **Abort** will take you out of the *Write* procedure.

When you are perfectly happy with your parameters select **Send** and the data will be transmitted to the Actiwatch. A red bar will appear at the bottom of the screen to indicate firstly the transmission of data to the Actiwatch and secondly that it is being verified. A blue bar will show the progress of the score times being sent to the Actiwatch. It is normal for the top part of the set-up screen to disappear and re-appear during the set-up process. A confirmation screen will then appear which tells you to remove the Actiwatch from the Reader – do not remove it before this confirmation appears.



You may review the score settings by clicking on the title bar just above that of the main Score analysis screen to show the score set-up.

Saving and loading Score the Score set-up

To Save a Score set-up, ensure that the score set-up screen is visible, select 'save Profile' from the file menu. You will be prompted to enter a name for your score set-up file (using Windows file naming rules). Click on 'Save' and your settings will now be saved to disk.

To load a Score-set-up file, select 'Load Profile' from the Score Set-up File menu. You will be prompted to choose a set-up file; make your selection and then click 'Open'. The score time information and multiple score parameters will be loaded from file.

Note: The score times are not recovered from the watch during set-up or read hence if you wish to re-use them it is advisable to save the settings.

3.04: Using the Actiwatch Score:

The Actiwatch-Score has a two digit 7 segment LED display and a marker button labelled with an 'S'.

When the beeper sounds (for 10 seconds max), the LED display will show a prompt for a score to be entered (this will depend upon how the prompts have been programmed). The subject should press the marker button the number of times corresponding to their subjective rating. The subjective score is shown on the LED display. If the subject inadvertently goes past the correct Score they should simply keep pressing the button and the unit will go back to the minimum value. They can continue pressing as before until they have entered the correct Score. It is the indicated Score that is recorded, not necessarily the number of presses.

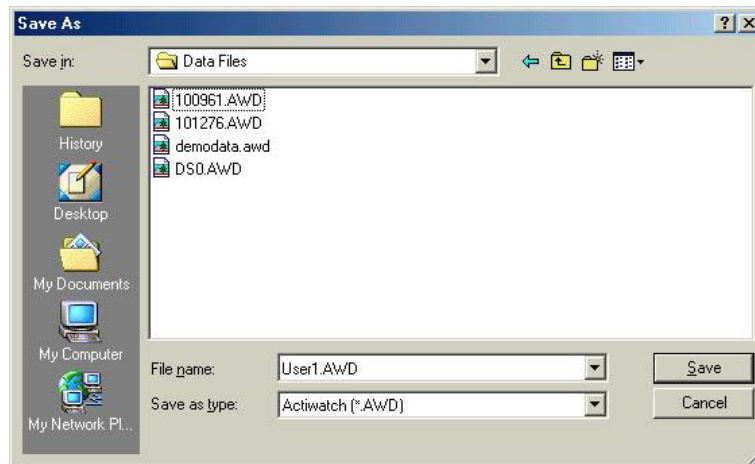


When the correct Score is shown, the subject should stop pressing. Within a few seconds the LED display will either go blank (Single scores) or prompt for the next multiple score. When all scores are entered and the displays are blank, the Scores will be stored in the memory. Further scores may not be entered for at least two epoch periods after a score session. The Marker button can be pressed without the subject being prompted (designated Manual presses). Such 'Scores' are represented by different colours in the data analysis screens.

3.05: Reading the Actiwatch-Score (Downloading Data);

Downloading, or Reading, data from an Actiwatch is simple;

- With the Actiwatch placed on the reader in the 'Ready' position, select 'Read' from the 'Reader' menu.
- The Actiwatch Setup screen will appear and a red progress bar will move across the screen indicating that data is being transferred from the Actiwatch to the PC.
- As each block of data is transferred it is enumerated on the screen.
- The upper screen will show the information in the Actiwatch from the *Write* procedure and how many bytes of data are in the file.
- The Reading procedure can be stopped at any time by Clicking in the *Stop Read* button (please leave the Actiwatch on the reader for about 1 minute to allow download of its latest information).
- Downloading a full Actiwatch can take a couple of minutes so please be patient.
- Upon completion of the read process, a message will be displayed prompting you to save the data.
- You should now choose to save your data by clicking the 'Yes' button. If you attempt to exit the software without saving data you will be prompted once again.



- You can save the data in any folder and with any file name you like. The default however uses the first 8 characters of the ID and saves the file in the software folder being used.
- The .awd file format is a tab delimited text ASCII file and as such can be easily imported into various other programmes such as spreadsheets for further analysis.
- Data can also be saved as .awc files, which allows for the data to be saved in a daily columnar fashion rather than as a string of information. This allows easier epoch to epoch comparison over subsequent days when using further Spreadsheet analysis for instance.

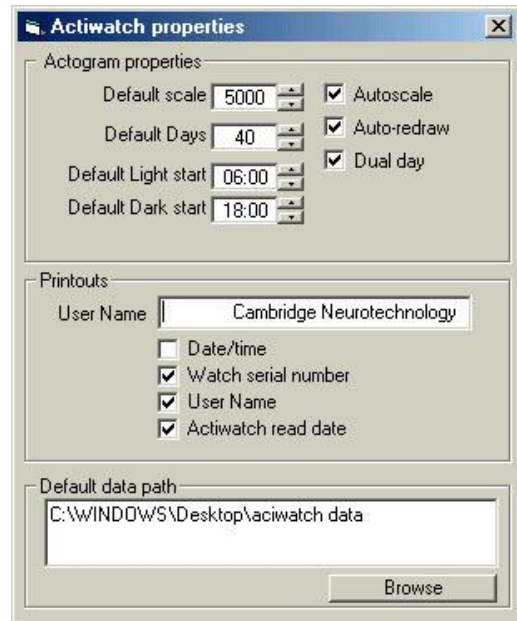
3.06: Changing Properties;

From the ‘File’ menu, select ‘Properties’. The properties for various aspects of the Analysis software may be adjusted from this window.

Actogram Properties:

The following Actogram properties may be set and will be applied every time the Actogram screen is opened;

- *Default scale:* The maximum value for the Actogram plots (software default is 5000).
- *Default Days:* The number of days in the Actogram display (software default is 40).
- *Default Light start:* The light-on time for the Actogram (software default is 06:00).
- *Default Dark start:* The Light-off time for the Actogram (software default is 18:00).
- *Autoscale;* The Actogram plot will be automatically scaled to the maximum value contained in the data.
- *Auto-redraw;* The Actogram plot is automatically refreshed after making changes to settings.
- *Dual Day;* The Actogram defaults to double plotted format when this control is checked.



Printed Report Properties:

The header for all printed reports may optionally include the following information;

- *User Name.*
- *Date/Time.*
- *Watch Serial Number.*
- *Actiwatch Read date.*

Default Data Path (file storage);

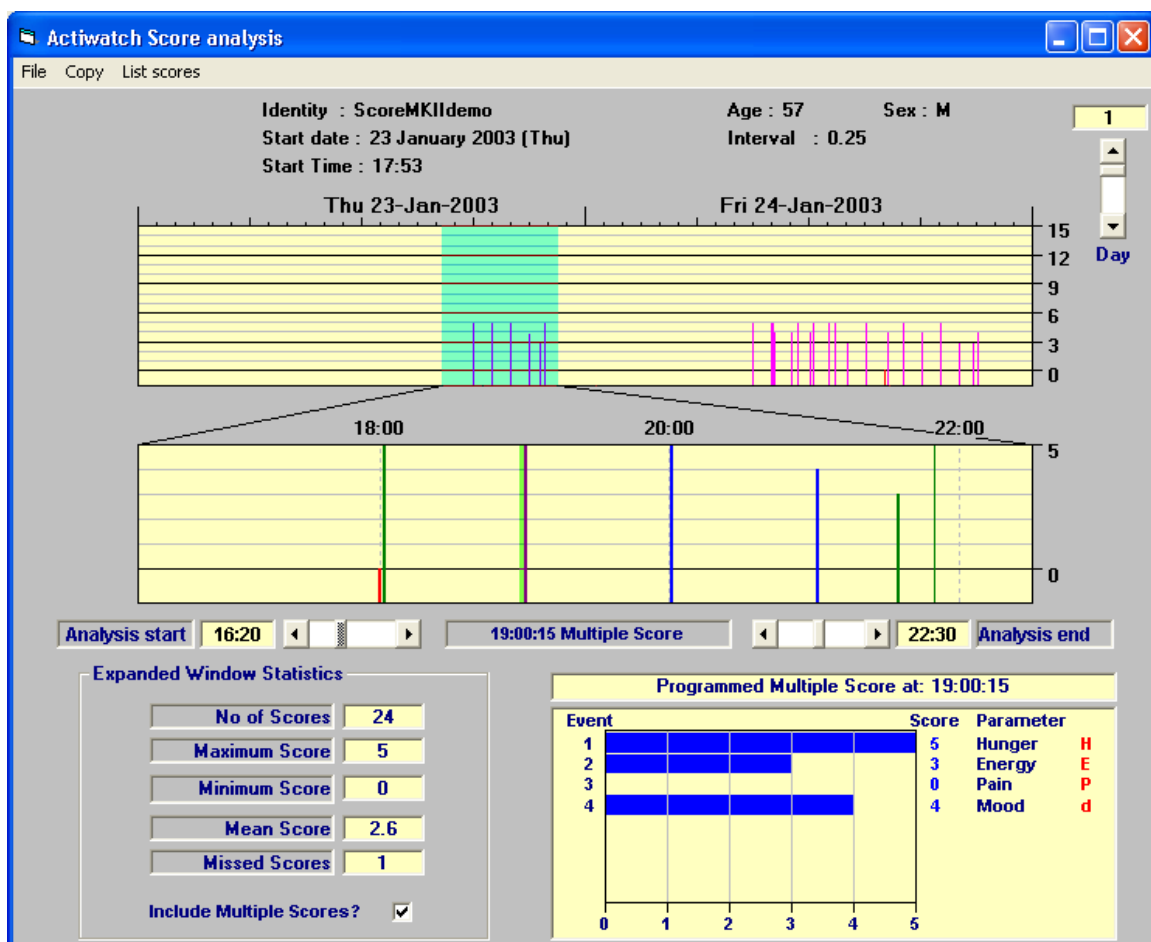
The default location for data files may be selected using this control. Use the ‘Browse’ button to locate and select the required drive and folder.

4.00 – Analysing The Data

NOTE: It is possible to perform a range of other analyses upon data collected with the Actiwatch-Score when using the Sleep Analysis software. Please consult the Actiwatch user manual for a full description of these analyses.

4.01: Score Analysis;

From the main screen, select ‘Score Analysis’, the display will be similar to that shown below;



The upper graph shows a two-day period starting from the day selected with the ‘Day’ control. Scores are indicated as vertical bars on the display with height corresponding to the score value. **For multiple scores, the height of the bar is equal to the maximum score within the session.** The middle graph is an expanded display that allows a section of the upper graph to be zoomed into for more detail.

To select period to be shown in the expanded graph, click on the upper plot with the left mouse key to set the start time and with the right mouse key to select the end time; the analysis period is highlighted in blue. Fine adjustment of the analysis start/end times may be made by use of the 'Analysis Start' and 'Analysis End' slider controls below the expanded plot.

Colour Coding of Scores

The scores are shown in different colours depending on their category. The colour key is as follows;

- Blue Bars: Programmed Scores (i.e. prompted at a specific time).
- Green Bars: Manual Scores (i.e. the user entered a score without being prompted).
- Red Bars: Missed Scores (the user did not enter a score when prompted)

When the mouse pointer is *hovered* over one of the above bars an indication of whether it is a single or multiple score is indicated in a small text box below the expanded display.

Multiple Score Details

Clicking on any multiple score in the expanded display will show full details of the scores within that session in a further graph display at the bottom of the screen. This display provides horizontal bars indicating the magnitude of each score, the parameter that the score relates to and the prompt that was shown on the Actiwatch. The bars are colour coded as detailed above. The multiple graph title shows the time of the session and the selected score is highlighted on the expanded display.

Expanded Window Statistics

To the left of the multiple score graph are the expanded window statistics. These show the following information;

Note: If the 'Include multiple scores' check box is checked, these values will include every score from within each multiple score session displayed in the expanded window.

- **No of Scores:** The total number of scores displayed in the expanded window.
- **Maximum Score:** The maximum score value within the expanded graph.
- **Minimum Score:** The minimum score value within the expanded graph.
- **Mean Score:** The average of the score values in the expanded window.
- **Missed Scores:** The number of scores missed by the user in the expanded window.

List Scores

Selecting 'List scores' will show a listing of date/time stamped score events. Where multiple scores are present, the listing will show the parameters as column headings.

Selecting 'Copy' from the list scores window will send a copy of these data to the clipboard ready for export into a spreadsheet if required.

It is possible to print a copy of the score listing by selecting 'Print' from the file menu.

Copy Score Data

From the score analysis display, select the copy menu to be presented with the following data export options;

Copy Scores (2 days): This will copy two days of score values (including all multiple scores where present) to the clipboard starting from the day selected with the day control. (This is effectively copying the data from the top graph to the clipboard).

Copy expanded data & Scores: This will copy the activity data and the score data (including all multiple scores where present) for the period shown in the expanded graph.

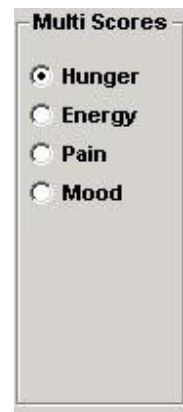
It is also possible to produce a printed report of the Score analysis screen by selecting 'Print' from the file menu.

4.02: Actogram with score data;

In the Actogram screen, activity and score data can be displayed together or separately. Select which parameter to display from the 'Display' menu in the Actogram screen (i.e. Activity / Score). The score levels are displayed as magenta vertical lines behind the black activity data.

Where multiple scores are present, a further set of options are provided at the left hand edge of the Actogram display. These options allow the displayed score parameter to be selected hence trends within any score parameter may be viewed (see figure to the right)

There is a number of advanced Actogram features that may be applied to Data collected with the Actiwatch Score, Please consult the main Actiwatch manual for full details.



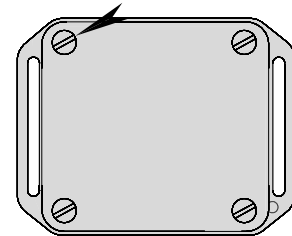
Appendix A – Maintenance & Trouble Shooting

Replacing Batteries;

Under normal circumstances and usage the battery life of those supplied in the Actiwatch units (CR2025 - a 3Volt, 150 mAmp/hour Lithium Manganese cell) is 6 months. However, for the Actiwatch-S Plus model the life is only 7 days with the microphone attached. Replacing the batteries should be done as a matter of course at 6 monthly intervals or before a study that encompasses this time. The battery is located beneath the stainless steel plate that is screwed to the Actiwatch.

With any Actiwatch units supplied after July 1997 (series 6 units), simply unscrew the 2 screws without shoulders leaving the top right and bottom left ones in relation to the orientation mark in place but loosened such that the base will pivot. By pivoting the base and turning the Actiwatch the battery will drop out and it can be easily replaced by one of the correct type and the screws tightened up. You should run the *Test Actiwatch* routine after changing the battery to check all is OK. This can actually be done before the final tightening of the screws. For older units the following procedure should be adopted:

1. Remove *three* of the screws from the back of the Actiwatch completely leaving the one at the opposite corner to the small orientation marker in place.
2. Undo this screw three turns.
3. Turn the Actiwatch over so that the black face is upwards and rotate out the base complete with the battery.
4. Replace the battery with a new one.
5. Rotate the base back into the correct position.
6. Tighten the single screw.
7. Place the Actiwatch on the reader and use the Test Actiwatch routine from the Reader menu.
8. If the Actiwatch is OK then replace the other 3 screws and the Actiwatch is ready for use.
9. If you wish to maintain the waterproofing of the Actiwatch the screws must have Loctite 242 thread sealant applied
10. If the Actiwatch does not operate then try steps 2 to 7 again with the same battery.
11. If this does not work then leave the battery in the Actiwatch for 10 minutes then re-test the Actiwatch.



After the battery change has been carried out check that the memory length of the Actiwatch is correct; if it is not replace the battery and test again.

If after changing the battery you find that the Actiwatch appears to have stopped functioning then it is likely that on insertion an electrical contact between the Actiwatch base and body has been rapidly made and then lost again. This will have caused the microprocessor in the Actiwatch to crash causing the apparent malfunction. Please remove the battery and replace it again and the Actiwatch will start working normally. Please contact technical support if you still have a problem.

Test Routines;

It is not usually necessary to test the Actiwatch units before each use. However, it is recommended following a battery change, if a problem is suspected or after if the Actiwatch has been idle for several months.

You will find a list of Test Routines under the Reader menu on the front screen with the following options:

Test Actiwatch:

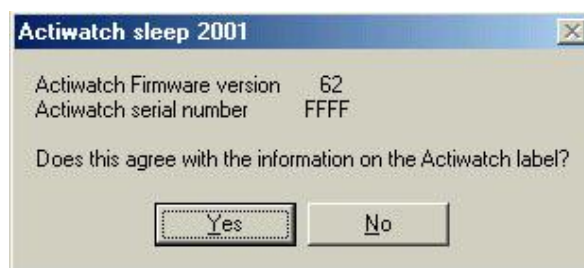
WARNING! Running this test routine destroys all data in the Actiwatch and resets it. Save data first.

Having correctly placed the Actiwatch under test on the Reader and established communication select ‘Test Actiwatch’ from the ‘Reader’ menu. A warning prompt will be shown to remind you that the data in the watch will be destroyed. If there is no communication at all the following message will be displayed.



If the battery is OK and you are sure of the correct COM port selection and Reader/PC connections, then the Actiwatch unit may have a malfunction and you should contact our Technical Support team (see later for contact numbers).

When communication is correctly established, a message box will appear to again warn that the data in the watch will be lost. Click on the ‘Yes’ button to proceed; the software will read the firmware version and serial number of the Actiwatch and display the following message;



Ensure that this data agrees with the label on the Actiwatch then proceed with the test. If the information does not agree, select ‘No’ and then change the information accordingly.

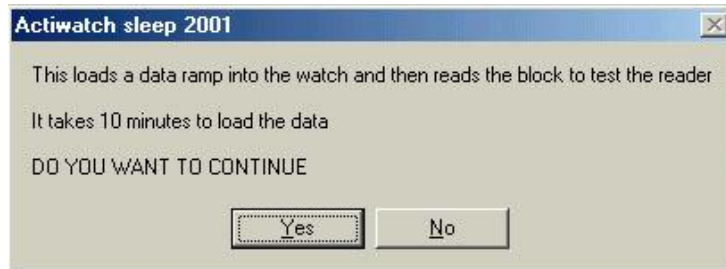
If the Actiwatch passes the test procedure an ‘Actiwatch test Passed’ message will be displayed.

If an error occurs, a warning message will be shown containing a stage number (e.g. failure at stage 4), please make a note of this number and contact the Technical Support Team.

Reader Tests:

WARNING! Running this test routine destroys all data in the Actiwatch and resets it. Save data first.

Having correctly placed an Actiwatch on the Reader and established communication select 'Test Reader' from the 'Reader' menu. The following message will be displayed;



This test routine loads a set of test data into the Actiwatch and then reads it back to test the reader. It can take up to 10 minutes to complete the test and the Actiwatch must not be disturbed during the test process.

Recovering (Dumping) Data:

If the normal method of reading the data fails and you need to recover data from an Actiwatch unit, you may use the *Recover Data option*. Note that this option should only be used if all else fails. Having correctly placed an Actiwatch on the Reader, select 'Recover Data' from the 'Reader' menu. A warning message will be shown that should be heeded; if in any doubt please contact us.

Select 'Yes' to proceed to the following window;

Make the appropriate selections and select OK. The data will be called Recover.awd and should be edited using Wordpad and be saved as a Text Document with the correct filename.

The recovered data file is always 32kB in length and hence some of the data in the file may be invalid.

Test routines may be cancelled by selecting the *Stop Test* button.



Trouble Shooting;

We are confident that you should have a trouble-free time when using the Actiwatch system. However, some easily solvable problems may occur examples of which are given below.

Reader red light does not come on when the Actiwatch is placed on it and/or the PC will not communicate with the Actiwatch:

- Check the Communication links – is the correct COM port selected?
- Is the Actiwatch on the Reader in the correct orientation – make sure the hole on the base of the Actiwatch and the dot on the Reader are in the same position whilst Reading.
- Have you tried sliding it up the Reader away from the grey rectangle?
- Are there any communication conflicts?
- Is sufficient power being ouputted from the PC (e.g. is the battery of your portable run down) to the Reader?
- Does the battery need changing?
- Is the Actiwatch placed Plastic Lid side down – i.e. can you see the ID number?

A power pack is available for the reader to boost the power output from your PC if required.

The PC will not let you access the Software:

- Is the COM port being used by another application?
- Have you sufficient free memory available to run the software?

If you have any doubts on the functioning of an Actiwatch unit run the Test Actiwatch routine as described earlier in this section. If an error is flagged please note it (with the appropriate number) and contact us with this information.

If you have any other problems with the Actiwatch system or have any technical queries please contact Technical support:

Tel: +44-(0)1480-831223

Fax: +44 (0)1480 831733

Email: technical@camntech.co.uk

For any other information on the products described in this Manual or other queries please contact us using the details provided at the front of this manual.