



# Reference Manual



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For use with  **version 6.1 or later**



## CLASSIFICATION



- Type BF Equipment
- Internally powered equipment
- Continuous operation



- Read Instruction Manual

## CAUTION

**RxOnly**

- US Federal Law restricts this device to sale by or on order of licensed health care practitioners.

## WARNING

- Do not operate active sensor within 10 feet (3m) of an operating cellular phone, similar radio transmitting device, other powerful radio interference producing sources such as arc welders, radio thermal treatment equipment, x-ray machines or any other equipment that produces electrical sparks.
- All encoders are totally isolated from line (110 or 220VAC) power due to battery operation and fiber optic connections to computers. However, many hospitals and the FDA require that computers, printers and any other equipment used with medical devices be electrically isolated from line voltage to UL or CSA medical safety standards.
- Do not connect inputs or outputs of the encoder or sensors to line powered devices, except through the fiber optic cable.
- The PC used with the encoder must be placed outside the patient/client environment (more than 3 meters or 10 feet) or the PC must comply with EN60601-1.1 (system safety).
- After use, the disposable electrodes may be a potential biohazard. Handle and, when applicable, dispose of these materials in accordance with accepted medical practice and any applicable local, state and federal laws and regulations.
- To diminish the risk of spreading communicable diseases, always use good hygiene practices with reusable EMG electrodes, particularly if abrasive substances are used. In all cases, refer to your facility's infection control procedure.
- Do not use in the presence of a flammable anesthetic mixture with air or with Oxygen or Nitrous Oxide.
- Not to be immersed in water.
- Take care in arranging patient and sensor cables to avoid risk of patient entanglement or strangulation.
- The operator is responsible for ensuring the safety of any devices controlled or triggered by Infiniti equipment or software, or by any software or hardware receiving data from Infiniti equipment. Infiniti equipment must not be configured or connected in such a way that failure in its data acquisition, processing or control functions can trigger patient feedback stimulus that poses an unacceptable level of risk.
- Use of any equipment in a biofeedback context should be immediately terminated upon any sign of treatment-related distress or discomfort.
- Not to be connected to a patient undergoing MRI, Electro surgery or defibrillation.

## ATTENTION

- To prevent static discharge from damaging the sensor and/or encoders, use antistatic mats or sprays in your working area. A humidifier may also be used to help prevent static environments by conditioning hot, dry air.
- Not for diagnostic purposes. Not defibrillator proof. Not for critical patient monitoring.
- To prevent voiding warranty by breaking connector pins, carefully align white guiding dot on sensor plug with slot on sensor input.
- Make sure to remove electrodes from sensor snaps immediately after use.
- Apply conductive gel only to electrodes; never put gel directly on sensor snaps.
- Always use electrodes between the subject and the sensor.
- Sharp bends or winding the fiber optic cable in a loop smaller than 4 inches (10cm) may destroy the cable.
- A fiber optic cable not fully pushed into its receptacle may cause the unit not to operate; make sure that both ends of the cable are fully inserted into their receptive jacks and the nut is tightened firmly.
- Do not plug third party sensors directly into instrument inputs. Plug only Thought Technology active sensor cable connectors into instrument inputs. All EMG electrodes and third party sensors must be connected to active sensors, either directly or through an adapter.
- Remove batteries when the device is not being used for extended period of time. Please dispose of battery following national regulations.

## INTENDED PURPOSE

- Biofeedback, relaxation and muscle reeducation purposes.

## CONTRAINDICATIONS

- None.

## NOTE

- No preventative inspections required; maintenance must be performed by qualified personnel.
- The supplier will make available, upon request, circuit diagrams, component parts lists and description or other information required for the repair of product by qualified personnel.
- If a fiber optic or patient cable is damaged or breaks, please replace it.
- Due to the essential performance and intended use of the device, testing for immunity to electromagnetic disturbances was not required and was not performed. The device may be susceptible at levels below IEC60601-1-2 immunity test levels.
- The operator must be familiar with typical characteristics of signals acquired by this equipment, and be able to detect anomalies in the acquired signal that could interfere with treatment effectiveness. Depending on the importance of signal integrity, it may be advisable to continuously monitor the raw signals, in time and/or frequency domain, while the device is being used for biofeedback or other purposes. If anomalies are observed on acquired signals, and if you suspect a problem with electromagnetic interference, contact Thought Technology for a technical note on identification and remediation.

## MAINTENANCE AND CALIBRATION

- Wipe encoder with a clean cloth.
- Factory testing and calibration ensure equipment accuracy and frequency response. The user may invoke a self-calibration function that will recalibrate certain device parameters (see section in hardware manual). Contact Thought Technology for factory recalibration if necessary.

## STORAGE

- Store in its original case.
- Temperature
  - -23 to +60C (-9.5 to 140F)
- Humidity (Non-condensing)
  - 10% to 90%
- Atmospheric Pressure
  - 70 to 106 Kpa

## TRANSPORTATION

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- Atmospheric Pressure
  - 70 to 106 Kpa

Guidance and manufacturer's declaration - electromagnetic emissions		
The Infiniti system is intended for use in the electromagnetic environment specified below. The customer or the user of the Infiniti system should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions, CISPR 11	Group 1	The Infiniti system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.  The Infiniti system is suitable for use in all establishments, including domestic establishments and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
RF emissions, CISPR 11	Class B	
Harmonic emissions, IEC 61000-3-2	Not applicable	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Not applicable	

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## Introduction

The Stress Control Suite is a set of simple tools, designed to help you do biofeedback therapy with your clients, even if you have little or no experience with biofeedback. The tools in this suite will help you assess your client's physiological responses to stressful situations and become aware of any abnormal patterns when they recuperate from stress.

The tools will also allow you to:

- Monitor arousal levels during therapy.
- Teach self-regulation with biofeedback.
- Teach tension and anxiety reduction strategies with simple relaxation techniques.

The Stress Control Suite works with Thought Technology's clinical grade physiological data acquisition devices, the ProComp2, ProComp5 Infiniti, and ProComp Infiniti encoders. It includes skin conductance and temperature sensors as well as the BioGraph Infiniti software. When using the assessment tool, you have the option of connecting a third-party blood pressure monitor (A&D UA-767PC) if you want to include blood pressure readings in the assessment measures.

This manual provides an overview of Biofeedback and its relationship to stress management, a description of the Stress Control Suite, and information about the hardware and software which are used with the suite.

It will guide you through the process of learning how to use your equipment, including:

- Connecting the device to the computer ([Hardware Setup](#) on page 5).
- Hooking-up sensors to the client ([Placing sensors on the client](#) on page 7).
- Using the software to do assessments and biofeedback training ( [Stress assessment](#) on page 10, [Biofeedback](#) on page 21, and [Learning relaxation](#) on page 25).
- Using the software to review sessions ([Reviewing the session](#) on page 16) and generate reports ([Generating session reports](#) on page 17).

## Biofeedback and the Stress Control Suite

Biofeedback is a non-invasive therapeutic approach which has existed since the 1960s. It involves:

- Measuring physiological processes using specialized sensors.
- Showing a representation of the physiological change to the client.
- Helping the client understand the effects of thoughts and emotions on the physiology.
- Coaching the client to learn new mental strategies and optimize self-regulation responses.

The Stress Control Suite packages a number of tools with which you can view, record and give feedback on two key physiological measures, skin conductance and peripheral temperature, which are directly associated with the stress response.

In the 1930s and 40s, Dr. Hans Selye (the father of stress) observed and documented the sequence of physiological changes which occur in a living organism when subjected to stress for long periods of time. Most people understand the perceived effects of stress on their own physiology, including increased heart rate, faster breathing, getting cold and clammy fingers, and having difficulty sleeping. The more insidious side effects of stress occur when a person is stressed for long periods without any time to recuperate. Although more evidence is required, there is a general understanding that prolonged exposure to stress can lead to anxiety, depression, heart disease, weight gain, and problems with memory and concentration (ref. AIS – American Institute of Stress).

Learning to properly manage one's stress is a key to living a happy, healthy, and productive life, and biofeedback is a very effective tool for teaching proper stress management skills to your clients.

The Stress Control Suite offers you an easy way to perform three main tasks:

- Assess and document your client's stress response patterns by running the 5 activity stress test.
- Teach your clients awareness and control of unconscious physiological processes by doing arousal and/or temperature biofeedback.
- Train your clients in easy but effective relaxation methods for practicing one of the three relaxation techniques

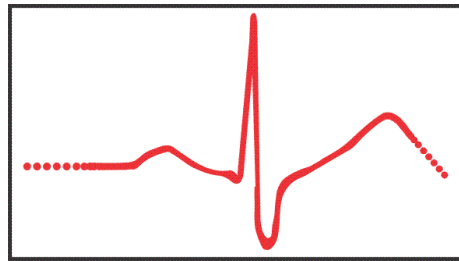
### Physiological signals

One of the most important aspects of doing physiological monitoring and biofeedback is the ability to use your equipment correctly and understand what is happening when running a session and recording physiological data. If you are a novice at biofeedback, we recommend you spend some time learning about this technology. There are many books on the matter and workshops, organized by professional associations, where you can acquire the necessary knowledge:

- [www.aapb.org](http://www.aapb.org): Association for Applied Psychophysiology and Biofeedback.
- [www.bfe.org](http://www.bfe.org): Biofeedback Federation of Europe.
- [www.bcia.org](http://www.bcia.org): Biofeedback Certification Institute of America.

A physiological sensor is an electronic device designed to capture a specific body process, such as heart rate, muscle tension or brain waves, and convert it to a measure that computer software can understand. Capture and conversion are done continuously, and produce a series of data points (or numbers). To help people understand what the data means, the software plots these numbers as a sequence of points on a graph. Because the sensor outputs many points per second, what we see is a line (signal) that moves up and down as it advances across a graph, moment by moment.





Graph of a typical EKG signal

### Arousal: Skin conductance

The skin conductance sensor has two electrode straps which are wrapped around two fingers of the same hand and measure changes in sweatiness that are caused by increasing or decreasing stress levels (arousal). Skin conductance (SC) is measured in micro Siemens ( $\mu\text{S}$ ). Resting values are usually below  $5\ \mu\text{S}$ . A stressed person can easily reach values of  $10\text{--}20\ \mu\text{S}$  (**Biofeedback Mastery: An Experiential Teaching and Self-Training Manual**. Association for Applied Psychophysiology and Biofeedback. 2008-05-18. Peper et al. ISBN: 978-0984297900).

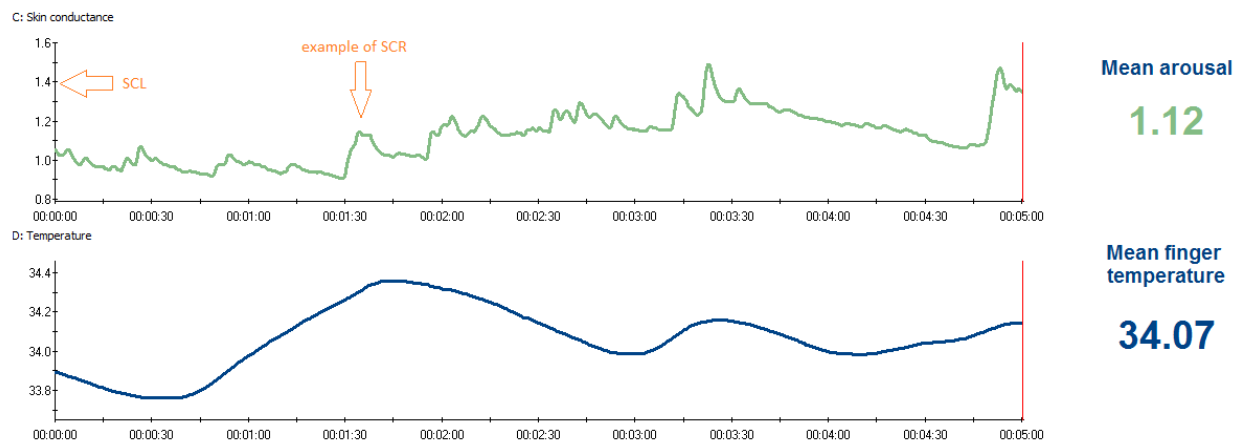
Two aspects of the skin conductance signal are of most interest: skin conductance level (SCL), which is the point-by-point variation in  $\mu\text{S}$  values, and skin conductance response (SCR), which is an arousal reaction to a stimulus. This reaction occurs each time the person feels a surge in emotion and appears as waves of varying amplitude along the skin conductance signal. The Stress Control Suite provides a measure for both aspects. The value displayed for SCL is the mean (average) of all the SC data points gathered over a period of time. The value displayed for SCR is the number of amplitude surges counted over the same period of time.

### Finger temperature

The tip of the temperature sensor is sensitive to heat variations. It is attached to the fleshy part of a finger and picks up cooling down or warming up of the skin caused by decreases or increases in blood flow (vasoconstriction or vasodilation). Temperature is measured in degrees Celsius or Fahrenheit. Our body's core temperature is normally stable at  $98.6\ ^\circ\text{F}$  ( $37\ ^\circ\text{C}$ ). Temperature biofeedback is interested in peripheral temperature variations (i.e. from a finger or a toe) because they directly reflect increases and decreases in activation of the sympathetic nervous system (SNS).

Our peripheral body temperature is significantly lower than our core temperature. The fingers and toes of a person under stress can have a temperature as low as  $18.3\ ^\circ\text{C}$ ,  $65\ ^\circ\text{F}$  (**Biofeedback Mastery: An Experiential Teaching and Self-Training Manual**. Association for Applied Psychophysiology and Biofeedback. 2008-05-18. Peper et al). The Stress Control Suite shows a measure of temperature which is either point-by-point (signal) or a mean (average) of all the temperature data points gathered over a period of time.

The following graphs show the signals and mean values for skin conductance (arousal) and temperature over a period of 5 minutes.



Whether you are recording an assessment or running a biofeedback session, you will be looking for changes in the signal's direction (going up or down), amplitude (in units of measure) and frequency (number of responses) to gather your clinical information.

## Performing biofeedback

Whereas physiological monitoring involves simply observing the physiological changes happening in your client during a specific intervention, biofeedback uses audio and visual cues to give information (feedback) about the direction of change of a given signal and whether or not it is in the desired state.

Most commonly, the clinician sets a threshold, which represents a clinical goal, and asks the client to make the line or bar (which represents the particular signal being monitored) move up or down and cross over or under the threshold in order to trigger the feedback. The client then tries various mental strategies (coached by the clinician) until he notices a reaction in the signal. He then learns to adjust his internal strategy (thoughts, visualization, affirmations, etc) until the signal starts changing in the desired direction. If he reaches the goal, the audio or visual "reward" acts as positive reinforcement, which helps him learn to accomplish this particular task.

It is important to understand that, as a clinical intervention, biofeedback doesn't affect a client permanently. Rather, it provides instantaneous self-knowledge which the client can use to learn a particular skill. As with any learning process, becoming proficient with self-regulation requires practice. Many practitioners suggest individual sessions of about 15-20 minutes each, frequent enough to allow retention between sessions, or at least twice a week.

The Stress Control Suite includes a series of biofeedback screens which you will use to train your clients to learn control over their arousal level (via skin conductance) and relaxation level (via peripheral temperature training). Before you start, though, it is important to assess your client's current physiological reactions to stress.

## Hardware Setup

This section of the manual describes briefly how to connect the encoder and the sensors, place the sensors on the client, and enter the key codes for the encoder into the software.

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**Note:** Illustrations in the manual show the ProComp2 and ProComp5 Infiniti encoders. The ProComp5 Infiniti and ProComp Infiniti encoders are physically very similar. Detailed information about your specific encoder is provided in the device's hardware manual.

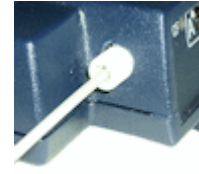
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### Connecting the TT-USB to the encoder



ProComp2

Insert one end of the fiber optic cable carefully into the fiber optic port on the encoder as far as it will go. Tighten the nut gently so that the cable won't slip out.



ProComp5 / ProComp Infiniti



Do the same with the other end of the fiber optic cable and the fiber optic port of the TT-USB interface unit.

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**Note:** The fiber optic connectors may break if they are hit directly, for instance, if the encoder falls onto the floor. To prevent damage, it is recommended to use the encoder belt clip to fasten it to the client or to a chair.

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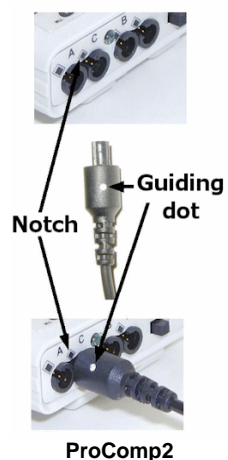
Insert the small connector of the USB cable into the USB port on the TT-USB interface device.

Insert the large connector of the USB cable into the USB port of your PC.



USB ports on a PC are generally located at the back of the base unit. You may also find a USB port at the front of your base unit; you can connect the other end of the USB cable to it. On a laptop, USB ports are usually located at the side or the back of the laptop. It is recommended to always use the same USB port for connecting the TT-USB to your computer.

## Connecting sensors to the encoder



ProComp2

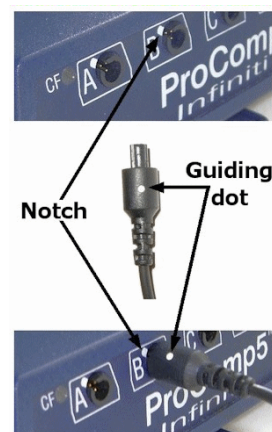
The Thought Technology encoder and sensors use specially designed connectors that have all metallic surfaces recessed within the plastic casing. These connectors, with protected pins, require care when you are plugging and unplugging sensor cables to the encoder or an extender cable to the sensor head.

When connecting a sensor cable to the encoder, make sure to properly line up the guiding dot on the top of the plug with the notch in the encoder input socket, as shown in the illustration. Forcing the plug into the jack in any other position may damage your equipment.



ProComp2

- The Skin Conductance sensor cable connects to the input socket labeled "C".
- The Temperature sensor cable connects to the input socket labeled "D".



ProComp5 / ProComp Infinity



ProComp5 / ProComp Infinity

## Connecting the third party blood pressure monitor to the system



Third party blood pressure monitor



SmartCable

The blood pressure monitor is purchased separately from the Stress Control Suite. It connects to the PC using a SmartCable with a phono jack on one end and a USB connector on the other.

Insert the phono jack end of the SmartCable into the port on the back of the blood pressure monitor.

Insert the USB connector of the SmartCable into the USB port of your computer.

After you start a session using the blood pressure monitor, the monitor's user interface screen flashes three rows of dashes to indicate that it is ready to be controlled by the software.

**Note:** The blood pressure device drivers must be installed on your computer before you can use the blood pressure monitor. Detailed installation instructions for the device drivers are included in the BioGraph Infinity documentation.

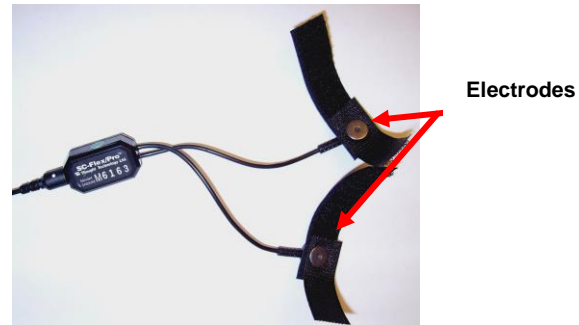
## Placing sensors on the client

The Stress Control Suite uses two sensors, a temperature sensor and a skin conductance sensor. If you are using the optional blood pressure monitor, put the blood pressure cuff on the client before you attach the sensors.

Attach the skin conductance sensor to the client as follows.

There are two finger straps attached to the skin conductance sensor.

The conductive electrode in each finger strap should be placed against the inside part of the finger.



A good choice for placement is to use the index and ring finger. Close the hook and loop fasteners around the fingers so that contact is snug yet comfortable.

Placement with the cables directed inwards (shown) is practical for keeping the cables out of the way.



Attach the temperature sensor to the client as follows.

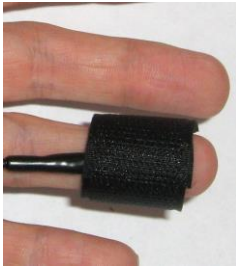
A hook and loop fastener is provided with the sensor.



Ensure that the end of the temperature sensor makes solid contact with the finger. Any finger can be used.

Shown here is the ring finger.

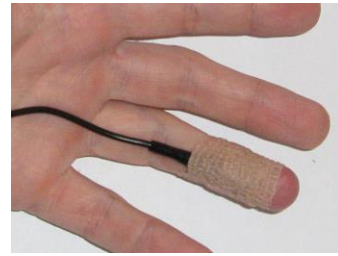




**With hook and loop fastener**

Use the hook and loop fastener to hold the temperature sensor to the finger.

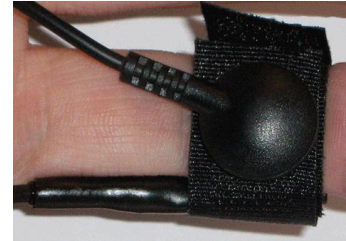
As an alternative, Coban tape can be used to provide a more secure fit attachment.



**With Coban tape**

You can also place the skin conductance and temperature sensors on the same hand. In this configuration, the temperature sensor is tucked under the ring finger strap of the skin conductance sensor.

If you choose to use this configuration, be careful not to lift the electrode off the skin or slide the temperature sensor between the electrode and the skin. Ensure that the end of the temperature sensor is secured firmly against the skin.



## Entering key codes

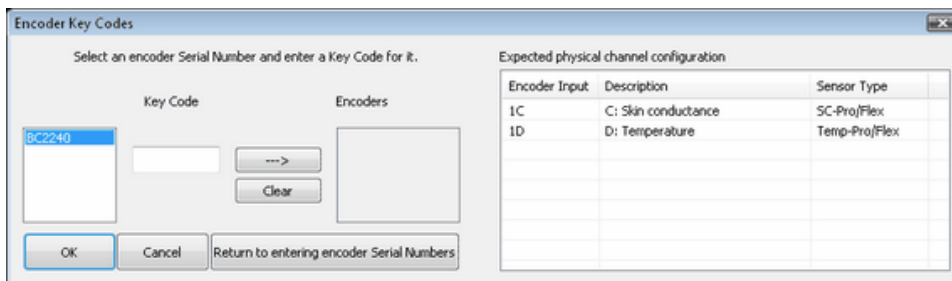
The first time you use an encoder to record a session, the BioGraph Infiniti software will check for its key codes and ask you to enter them. This registers the encoder with the software, and you won't need to enter the key codes again.

**Note:** If you have more than one encoder, you will need to enter key codes for each unit the first time you use it to record a session.

1. Click **Quick Start**, select a name from the **Clients** list and a protocol from the **Favorites** list, and then click **OK**.

The **Encoder Key Codes** dialog box opens.

2. Click to highlight your unit's serial number in the left table (in this example, BC2240; this is the same number as on the back of the unit).



The serial number is found on the back of the encoder.




**ProComp2**



**ProComp5 / ProComp Infiniti**



3. Enter the **Encoder Key Code** (found inside the encoder battery compartment) in the **Key Code** text box.
4. Click  to move the serial number from the left table to the right table.
5. When the serial number appears in **Encoders**, click **OK**.

Now the **Application Key Code** dialog box opens.

6. Enter the Application Key Code.

This number is found in the battery compartment with the encoder key code.

7. When done, click **OK**.



If the key codes have been entered properly and there is no problem with your encoder setup or your sensor connections, the recording screen will open.

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**Note:** Detailed instructions for using the software are provided in document SA7913, **Getting Started with BioGraph Infiniti**, which is provided with BioGraph Infiniti.

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# Using the Stress Control Suite

## First step: Stress assessment

The principal component of the Stress Control Suite is the stress assessment. The 10 minute assessment takes your client through alternating periods of stress and rest, records the changes in skin conductance and temperature which occur in each stage of the test, and allows you to visualize these changes so you can understand how your client was able to deal with stress and return to restful state. Using the stress test, you can observe physiological reactions and identify possible problems.

The “5 activity stress test” takes 15-20 minutes to administer (from hooking up the sensors to generating a report) and gives you and your client information about each stage of the test. For the test to be successful and generate useful clinical information, you have to instruct and guide your client along the way by following the instructions on the screen and prompting him at the right time. This way, you can make sure that the client stays as engaged as possible in the exercise.

The test’s sequence of activities is:

1. **Baseline (2 minutes):** Records physiological data in the “initial” state. The client should be relaxed and stay as immobile as possible.
  - Prompt the client to sit back and relax while looking straight ahead of him and remaining still.
  - Let him find a comfortable position before you start.
2. **Color words test (2 minutes):** Puts your client under moderate stress levels by asking him to perform a mentally challenging task under controlled pressure. The Color Words test shows words, on the screen, written in different colors. The client has to say the color of the words but not read the actual word. The example below would require the client to say: "Orange, green, blue, yellow, red".



- The words stay on the screen for varying amounts of time. The pace is fairly slow at the beginning but quickly accelerates until it becomes nearly impossible to keep up.
  - To make the test more stressful, follow your client’s responses and comment assertively each time he makes a mistake. For example, you can say “Wrong!” at each error. You can also say “Next!” or prompt him to “Go faster!” if you notice fatigue or a slowdown in your client’s pace.
  - Keep in mind that the idea is not to help your client get the answers right, it is to put him in a controlled stressful situation. For the test to work, there must be observable physiological responses, so you have to create enough pressure for this to happen.
3. **Rest 1 (2 minutes):** Immediately after the Color Words test, the screen changes and the software starts recording a rest period. There is no pause between activities, because the transition phase between stress and rest is important in the physiological assessment.
    - When the screen changes, immediately prompt the client to sit back in a comfortable position, breathe normally and relax until the next activity.
  4. **Math test (2 minutes):** The second period of stress involves a simple math task which your client has to perform as quickly as possible. The screen shows a list of numbers (i.e., 1018, 1011, 1004,



etc.). You give your client a starting number (it doesn't have to be the top one) and ask him to subtract 7 from that number, tell you the result and continue subtracting 7 from the resulting number for 2 minutes, as fast as he can. The list on the screen is correct. If his answer is right, encourage him to "Continue" and "Go faster". If his answer is wrong, assertively comment on his error, give him the correct number and tell him to continue.

- During this stage of the test, turn the screen away from the client so he can't see the numbers.
  - Once more, the true goal is to put your client under enough stress that you can observe changes in his physiology.
5. **Rest 2 (2 minutes):** Immediately after the Math test, the screen changes and the software starts recording a rest period without a pause.
- Immediately prompt the client to sit back in a comfortable position, breathe normally, and relax until the end of the test.
  - At the end of this rest period, the stress test stops. The software prompts you to save the data and asks if you want to review the recorded session.
  - Remember to thank the client for doing a good job, carefully unhook the sensors and ask your client for any relevant feedback on how he felt during the test.

### Running the 5 activity stress test

**Note:** The first time you use an encoder to record a session, the BioGraph Infiniti software will prompt you to [enter key codes](#). Follow the instructions on page 8 to do so. You will only have to do this once.

1. Launch BioGraph Infiniti and click on **Quick Start**.
2. In the **Clients** list on the left, select an existing client name or use **Add New Client** to create a record for this client.
3. If the list on the right is empty, click the **Categories** drop-down list and select the correct category for your encoder:
  - **Stress Control – ProComp2**
  - **Stress Control – ProComp Devices** (use this category with the ProComp5 and ProComp Infiniti encoders)
4. In the list of **Favorites**, select **5 activity stress test** and click **OK**.



Clients:

Full Name	ID Number	Clinic ID
Ballance, Tara	1	
Florimond, Dorian	2	
Dorimond, Florian	3	
Shores, Lajolla	4	
Keyes, Florida	8	

Categories

Stress Control - ProComp 2

Categories


Stress Control - ProComp Devices

Favorite

Description
5 activity stress test
Arousal and temperature training
Guided relaxation
Relaxation with binaural beats
Relaxation with paced breathing

5. Ensure that:

- The sensors are properly hooked up on the client.
- The device is properly connected to the PC.
- Your encoder is turned ON (ProComp2: green light is on; ProComp5 or ProComp Infinity: blue light is on).
- Optionally, the blood pressure monitor is connected to the PC.

6. Click the **Start** button  to start the session, and follow the instructions in the [Screen sequence](#) starting on page 13.

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**Note:** Remember the guidelines for administering the stress test provided on page 10.

---

When the script ends, the software will display the following sequence of messages.

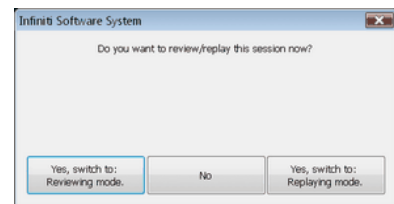
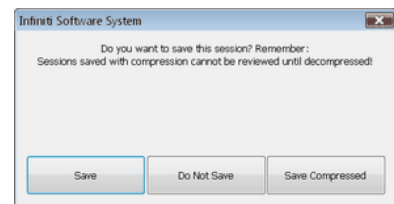
7. Select **Save**.

The **Session Notes** window opens so that you can enter, if you want, a treatment code, a session description and other relevant information.

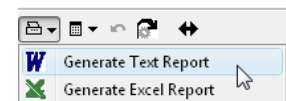
8. Click **OK** to continue.

9. Choose **Reviewing mode**.

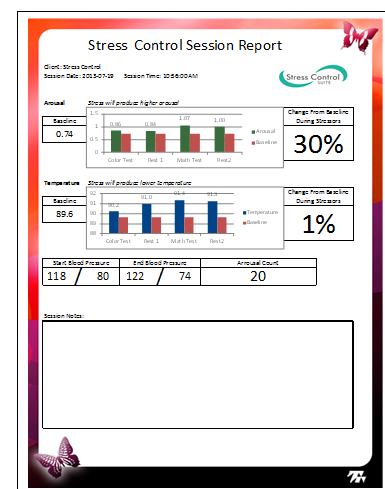
The session will open, displaying the review screen, which shows the session graph and appropriate statistics. If you were using a blood pressure monitor, it will also show systolic and diastolic blood pressure values.



10. Click the **Session Report** icon in the tool bar and select **Generate Excel Report**. Microsoft Excel opens and displays your report as a workbook.



The review screen and its reporting functions are described more fully in [Reviewing the session](#) on page 16 and [Generating a report](#) on page 17.



## Screen sequence

### Introduction screen

When you launch the 5 activity stress test session Quick Start, after selecting a client and clicking **OK**, the introduction screen appears.

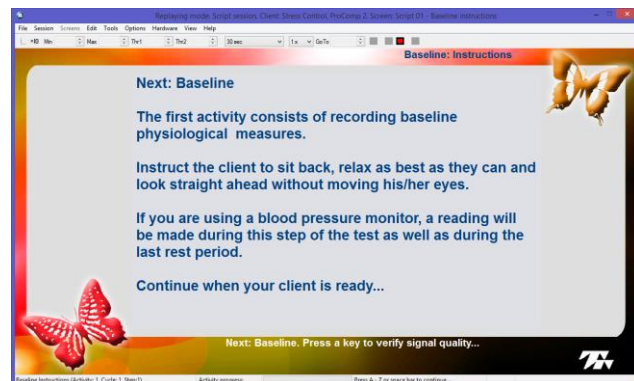
Describe what the stress test is about to your client and click the **Start** button when your client is ready to go.



### Baseline instructions

The instruction screen describes the next step of the assessment, which consists of recording baseline measures.

Explain this to your client and press the **Space bar** to continue.

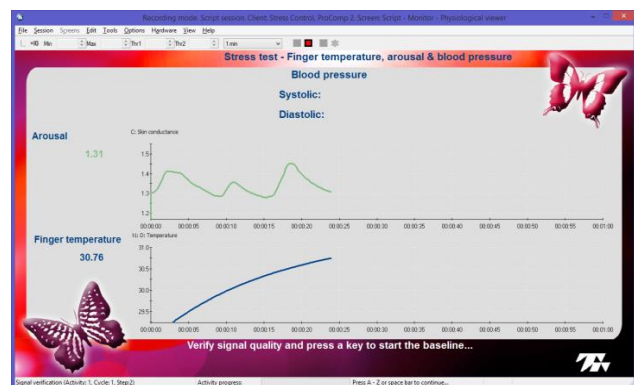


### Baseline signal verification

The signal verification step allows you to check that the sensors are placed on the client correctly and that you are seeing valid physiological measures. The temperature signal takes a few seconds to stabilize. Wait for the line to stop rising before continuing.

Remind the client that a blood pressure reading will be made as soon as the next step starts.

Press the **Space bar** to continue.



### Baseline recording & BP measure

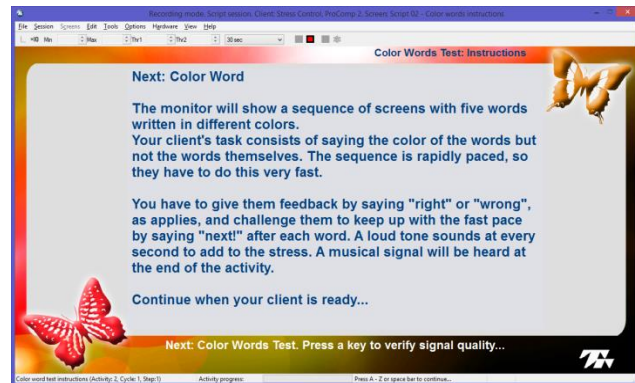
The baseline recording step takes 2 minutes and starts with a blood pressure reading. Remind the client that he should remain quiet and breathe normally for 2 minutes.



### Color words instructions

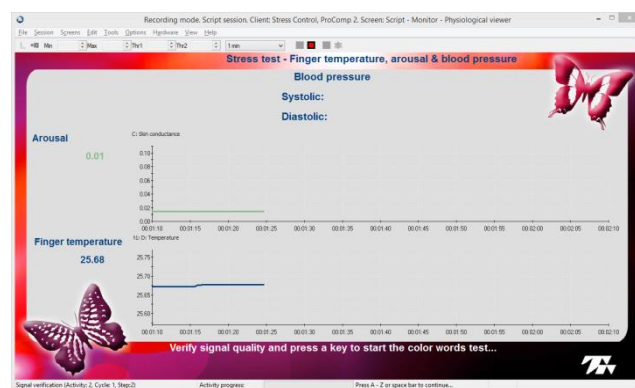
After the baseline, the assessment pauses for instructions. Explain the Color Words test to your client and make sure he can see the screen comfortably.

Press the **Space bar** to verify the quality of your signals once more.



### Color words signal verification

The signal verification step allows you to check that the sensors are placed on the client correctly – and have not moved or fallen off – and that you are seeing valid physiological measures.



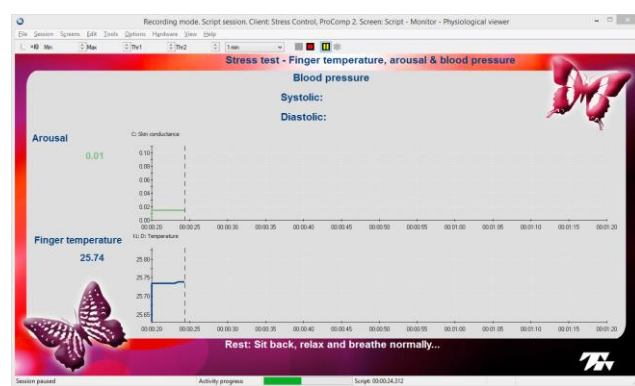
### Color words recording

The color words test shows lists of words written in different colors. Ask your client to say the color of each word but not read the words themselves. The pace slowly accelerates during the two minutes.



### Rest 1

The Rest 1 period starts immediately after the Color Words test in order to record the transition between stress and rest. Make sure you tell your client to sit back and relax for the next 2 minutes as soon as the screen changes.

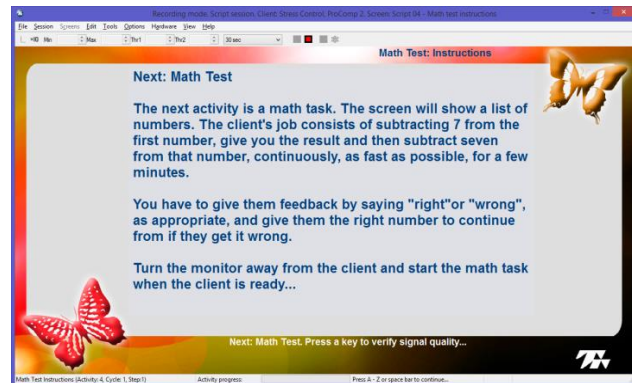




### Math test instructions

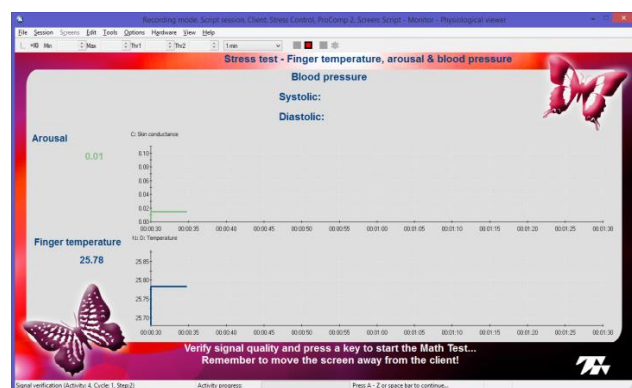
After the Rest 1 period, the assessment pauses for instructions. Explain the Math test to your client and make sure the screen is turned away from him and toward you so you can see the numbers and prompt your client.

Press the **Space bar** to verify the quality of your signals once more.



### Math test signal verification

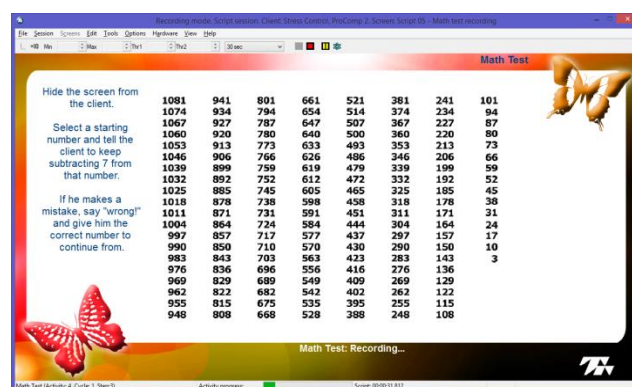
The signal verification step allows you to check that the sensors are placed on the client correctly – and have not moved or fallen off - and that you are seeing valid physiological measures.



### Math test recording

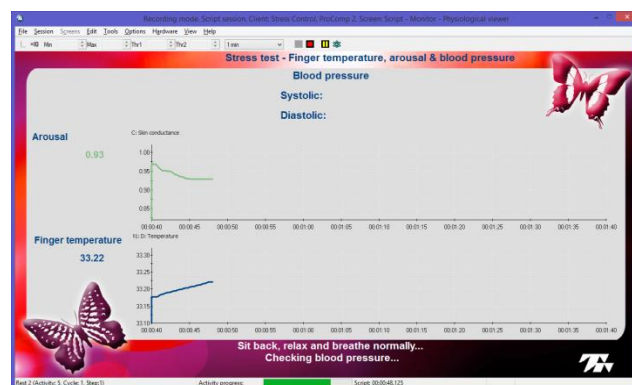
Give your client a starting number from the list and follow his responses. Say "Wrong!" and give the correct answer if he makes a mistake. To sustain a high enough stress level, keep urging your client to "Go faster" every few numbers.

Near the end of the test, remind the client that a blood pressure reading will be made soon.



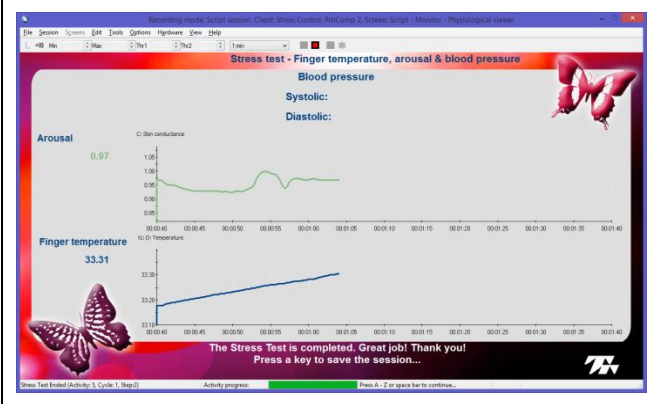
### Rest 2

The second and last rest period starts immediately after the Math test and takes a blood pressure reading right away. Remind the client that he should remain quiet and breathe normally for the next 2 minutes.



### End of script

Thank the client for doing a good job and unhook the sensors carefully. Ask for feedback and insight.



### Reviewing the session

After you have saved the 5 activity stress test session, BioGraph asks if you want to review or replay the session (click **Review**). The review screen is loaded and shows your session graph and appropriate statistics. If you were using a blood pressure monitor, it will also show systolic and diastolic blood pressure values.

### Stress test review screen

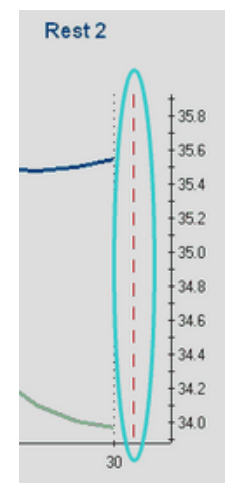
The screen shows trend graphs (averaged) of the changes in arousal (skin conductance) and temperature over time. Activity markers (black vertical lines) separate the 5 activities so you can see how signals increase or decrease during the stressor and resting activities. Along the top, you can see session statistics and – if any were recorded - blood pressure readings.



### Time Mark

The Time Mark is the dotted red vertical line which you can see at the far right of the graph (circled in blue in the image to the right). By default, the Time Mark appears at the end of the session to show the last values which were calculated for the session.

When reviewing a stress test session, the statistical values and blood pressure readings shown on the screen represent the last activity, in this case, Rest 2. You can move the Time Mark along the graph by pressing the **[Alt]** key on your keyboard and pressing the **[◀]** (left arrow) key a few times. Each time you do this, the Time Mark jumps to the previous activity marker (black line), to show you the statistical values calculated for the previous activity. Note that no value appears on the screen when you reach the very beginning of the session. Press **[Alt]+[▶]** a few times and then **[Control]+[End]** once to make the Time Mark jump to the end of the session again. **[Control]+[Home]** will make it jump back to the beginning.



### **Interpreting the trend graph**

When a person suddenly faces a demanding situation, the stress response (fight or flight) causes an increase in hand sweatiness and a decrease in blood flow to the hands and feet. Hand sweatiness increase translates into an increase in skin conductance while reduced blood flow translates into cooling down of the fingers. This reaction is directed by the sympathetic nervous system.

- During the Color Word and Math test activities, you should normally see an upward trend in the arousal (green) signal and a downward trend in the temperature (blue) signal.

When the stressful demand stops and the person can start relaxing, the parasympathetic nervous system takes over and the person's physiology can return to normal. Arousal should decrease and temperature should start increasing.

- During the Baseline, Rest 1 and Rest 2 activities, you should expect opposite trends: Arousal should be going down and temperature up.

It is important to remember that temperature signal changes very slowly because warm blood has started flowing again (vasodilation) and it takes some time for the warmth to spread across the skin. You will not see changes in the temperature signal direction at the beginning of an activity, but they should be obvious towards the end of the activity.

The skin conductance signal is much more responsive and should show trends right away. Because it is very dynamic, the signal can show upward and downward movement during an activity. The important information is in the overall trend.

The baseline activity shows you the initial state of your client's physiology. It may not represent his true "resting" state since having to do a test involving sensors and computers may not be completely without stress but, if you've explained the procedure and what is expected of him prior to running the test, it should still be fairly representative of a "non-aroused" state. After each stress period, during the rest period, you should see a tendency in both signals to return toward the resting values.

- You may notice plateauing. This occurs when signals do not fully return to baseline values but stabilize somewhere in between, and the signals stabilize at a higher value during Rest 2 than Rest 1. This is a pattern worth noticing because it may be a sign that this person builds up stress levels over time and has a hard time relaxing.

You may notice atypical responses in one or both signals when arousal decreases or temperature increases during the stressful activities. These atypical patterns are worth noting since they may reflect various physical or mental responses.

It is not within the scope of this manual to provide more detail about the clinical interpretation of physiological changes during stress test assessments. You can find an in-depth discussion of the subject in a number of books, such as ***The Clinical Handbook of Biofeedback. A Step-by-Step Guide for Training and Practice with Mindfulness***. Wiley-Blackwell. 2013. Inna Z. Khazan. ISBN: 978-1-119-99371-1.

### **Generating a report**

In review mode BioGraph Infiniti 6.1 can generate three types of session report.

**Report screens** are designed to display session statistics and trends while you are reviewing a session inside BioGraph Infiniti. They have been predefined and customized for the Stress Control Suite and are available within the set of existing screens.


**Text reports** include general information about the session as well as optional information (session notes, statistics, markers) that you select. A text report can be generated from any screen which includes line graphs or trend graphs. Text reports are generated from Microsoft Word templates, and can be saved or printed using the Word functions. Text reports are preferred for open display sessions, but they can also be generated for script sessions.

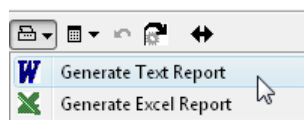
**Excel reports** have been predefined and customized especially for the Stress Control Suite. An Excel report transfers session statistics from the session data file into a Microsoft Excel workbook and subjects them to further analysis. Excel reports can be saved or printed using the Excel functions.

1. To generate a session report, enter review mode either immediately after recording a session or from the Database window by selecting the session from the database and clicking on **Review/Report**.
2. Report screens defined for the session are preselected for you. Click **OK**.
3. After the screens have loaded, move the session scroll bar to the far right. This ensures that the report screen displays statistics for the full session.



Report screen loaded in BioGraph Infiniti

4. If more than one report screen is loaded, open the screen from which you want to generate the report. Different screens can generate different reports.
5. Click the **Session Report** icon  in the tool bar and select the type of report that you want to generate.



6. If you select **Generate Excel Report**, Microsoft Excel opens and displays your report as a workbook. You can print or save the report using Excel's **Print** and **Save** functions.

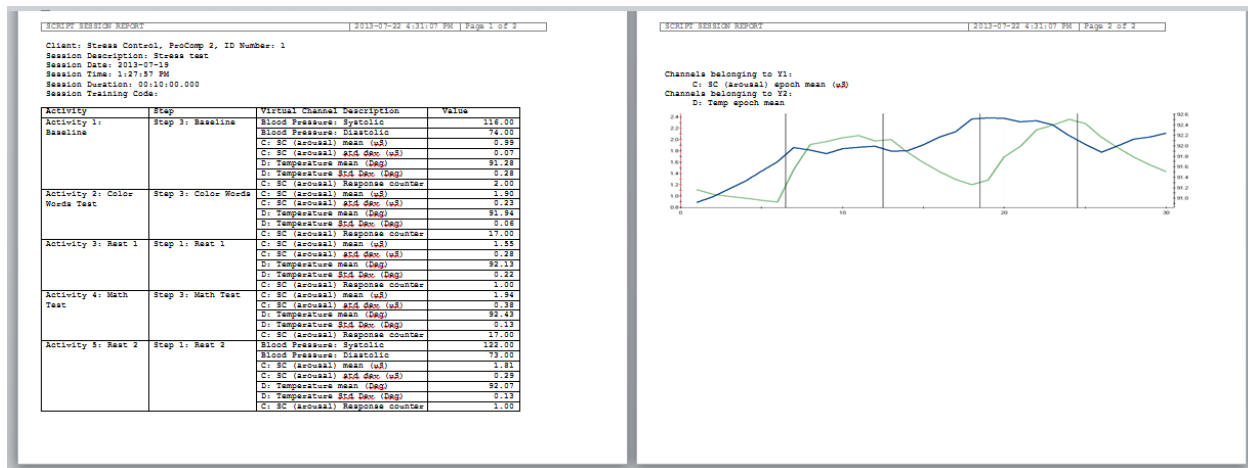


- If you select **Generate Text Report**, the **Session Report** window opens, and you must continue to the next step.
- Select report components by placing a check mark in the desired boxes.
- Click **Generate Report** to generate the report. Word opens and displays your report as a document. You can print or save the report using Word's **Print** and **Save** functions.

**Note:** Microsoft Word and Microsoft Excel must be installed on your system for these functions to work.

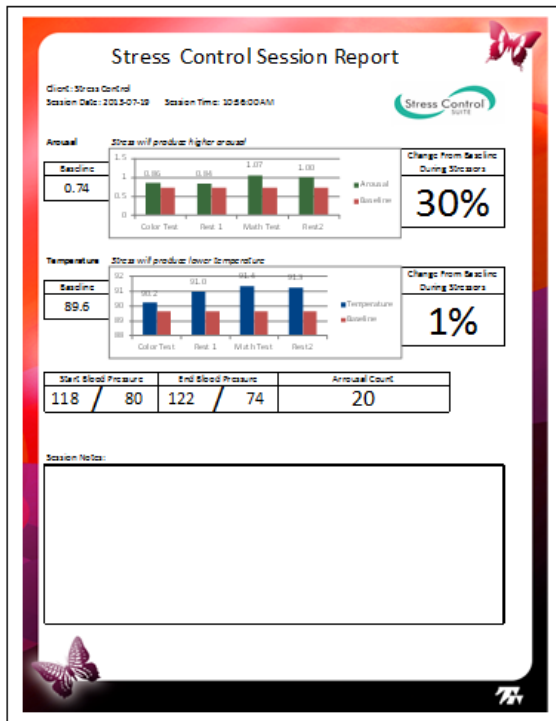
## Text report

The Text Report dialog box offers a selection of report components that you can include or exclude by selecting appropriate check boxes. The example shows client information contained in the header as well as session statistics and session Trend Graphs.



Once the report is generated, you can add or remove components and type in session notes and comments if you wish. From within Microsoft Word you can use the **Save as** function to save the report in a document folder location of your choice. This allows you to keep a record of the session reports.

## Excel report



The Excel report generates a one page review of the Stress Test assessment. Baseline mean values are shown along the left edge and bar graph compares those means with the means obtained in the stressor and rest activities following the baseline. Baseline means are shown in dark red. Arousal means are shown in green and temperature means in blue.

The report computes the percentage of change from baseline for both measures and shows percentage values along the right edge. The percentage is calculated as the relative difference between the baseline mean and the average of the means from both stressor activities.

Below the bar graphs, the table shows blood pressure readings taken during the **Baseline (Start)** and **Rest 2 (End)** activities as well as the total count of arousal responses recorded during the whole test.

You can write session notes in the box at the bottom of the report page. From within Microsoft Excel you can use the **Save as** function to save the report in a document folder location of your choice. This allows you to keep a record of the session reports.

## Second step: Biofeedback

Once you have determined your client's typical physiological responses to stressful situations using the 5 activity stress test, you can run biofeedback sessions with your client using either arousal reduction or finger warming up biofeedback. The Stress Control Suite includes 5 feedback screens that you can use for this purpose.

### Running a biofeedback session

1. Launch BioGraph Infiniti and click on **Quick Start**.
2. In the **Clients** list on the left, select your client's name from the list.
11. If the list on the right is empty, click the **Categories** drop-down list and select the correct category for your encoder:
  - **Stress Control – ProComp2**
  - **Stress Control – ProComp Devices** (use this category with the ProComp5 and ProComp Infiniti encoders)
3. In the list of **Favorites**, select **Arousal and temperature training** and click **OK**.



Clients:		
Full Name	ID Number	Clinic ID
Ballance, Tara	1	
Florimond, Dorian	2	
Dorimond, Florian	3	
Shores, Lajolla	4	
Keyes, Florida	8	




Categories

Stress Control - ProComp 2

Categories

Stress Control - ProComp Devices

Favorite	
Description	
5 activity stress test	
Arousal and temperature training	
Guided relaxation	
Relaxation with binaural beats	
Relaxation with paced breathing	

4. Ensure that:
  - The sensors are properly hooked up on the client.
  - The device is properly connected to the PC.
  - Your encoder is turned ON (ProComp2: green light is on; ProComp5 or ProComp Infiniti: blue light is on).
5. Click the **Start** button  to start the session, and follow the guidance in [Screen descriptions](#) starting on page 23.
6. Switch from one screen to another by clicking on the numerical buttons on the toolbar  
.
7. To end the session, click the **Stop** button .

## General concepts

The 5 feedback screens which come with the Stress Control Suite are designed to minimize clinician intervention by being set to do many things automatically. You do not have to set scales or threshold values because the software manages this for you. As you record feedback sessions with your clients, you should notice these features and explain what is happening to your client so they don't cause distress and disturb the training session.

### Automatic scaling

As the signal is plotted along the line graph, it also moves up and down as the client is responding to your coaching and changes in his thoughts and emotions. If the signal reaches the top or the bottom of the graph, the software automatically scrolls the scale (vertical axis) up or down by a few units to keep the signal into view. Each time this happens, your client may notice that the signal jumps a bit on the screen.

### Automatic threshold

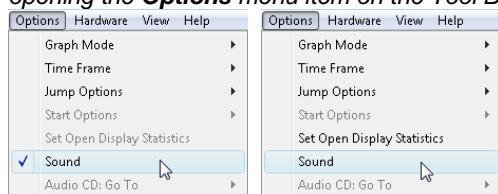
The left side of the screens is occupied by one or two bar graphs. As the signal increases or decreases, the color bar gets taller or shorter along its scale. The orange line which follows the bar is the automatic threshold. The threshold is programmed to follow the signal and stay just behind it so the signal will immediately cross the threshold if it changes direction. This ensures that feedback is given right away when the client makes an internal change which translates in a significant change in his physiology.

### Audio tone feedback

Four of the feedback screens give proportional or inverse-proportional tone feedback. As the arousal signal increases, for example, you can hear higher and higher notes to indicate an increase in stress level. If the client starts relaxing, the pitch of the notes will start lowering. Proportional tone feedback is useful if the client wants to close his eyes and practice relaxation techniques without looking at the visual feedback on the screen. The exercise consists of letting the notes get lower and lower.

Temperature feedback uses inverse-proportional feedback because peripheral temperature decreases when stress increases. Therefore, in order to keep the same feedback goal, i.e. to let the notes get lower and lower, the system has to give inverse-proportional feedback. As the client gets more and more relaxed, the notes get lower and lower.

**Note:** Sound feedback (audio tones and music) can be muted either by using the **Mute** function on your PC, or by opening the **Options** menu item on the Tool Bar and clicking on **Sound** to remove the check mark.



### Music and animated feedback

Four of the feedback screens also give “high/low” volume feedback to indicate if the signal is in the desired condition in relationship to the threshold. When doing arousal biofeedback, the goal is to reduce the level of arousal. The signal therefore has to be under the threshold to hear music at the loudest volume. The volume lowers as soon as the signal moves over the threshold to let the client know that something happened to increase his arousal level.

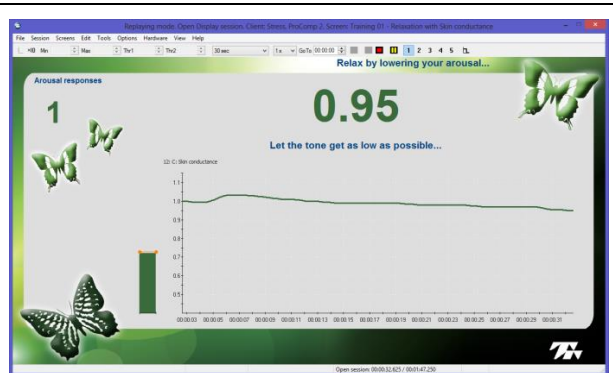
Three screens show visual feedback in the form of animations. The arousal training screen plays the animation when the arousal level decreases and pauses the animation when it increases. The temperature screen plays the animation forward when the client's fingers are warming up and backwards when fingers are getting colder.

The last training screen, Training 05, uses two sets of musical instruments, which are turned on and off from the arousal and temperature threshold conditions. The temperature controls the main melody while arousal plays the accompaniment part. The training goal is to play the full piece.

## Screen descriptions

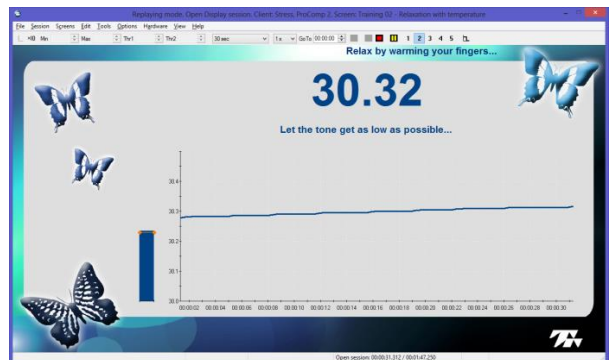
### **Training 01 – Relaxation with arousal**

This screen plays music and a decreasing tone as arousal is reduced. The music gets quiet and the tone's pitch rises again if it starts going up. When this happens, the butterflies turn red and the number of arousal responses is incremented. Coach the client to relax and let the tone get as low as possible and as few responses as possible.



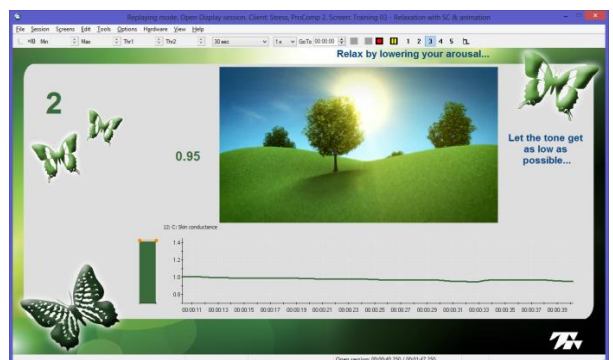
### **Training 02 – Relaxation with temperature**

This screen plays music and a decreasing tone as your client's fingers warm up. The music gets quiet and the tone's pitch rises again if they start getting cold again. When this happens, the butterflies turn red. Coach the client to relax and let the tone get as low as possible.



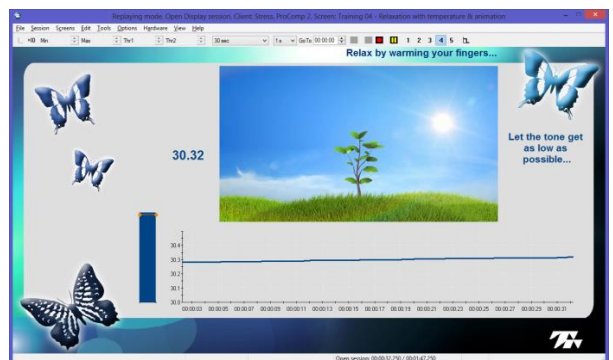
### **Training 03 – Relaxation with arousal and animation**

This screen is similar to Training 01 with the addition of an animation which plays when the arousal level is decreasing and stops playing when it increases. Use this screen as an alternative Training 01 when the client gets bored or if he prefers visual to auditory feedback.



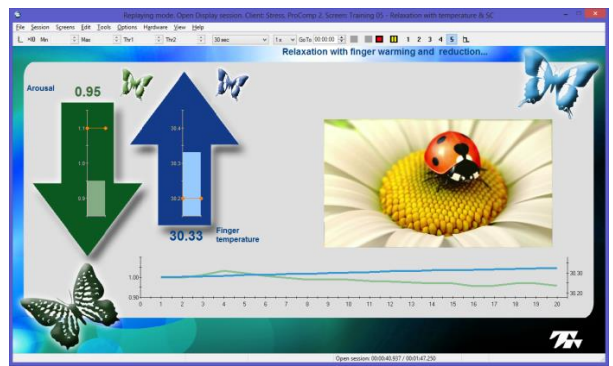
### **Training 04 – Relaxation with temperature and animation**

This screen is similar to Training 02 with the addition of an animation which plays forward (plant grows) when the temperature is on the rise and backwards (plant shrinks) when it decreases. Use this screen as an alternative to Training 02 when the client gets bored or if he prefers visual to auditory feedback.



### Training 05 – Relaxation with temperature and arousal

This screen combines arousal and temperature training into one feedback exercise. The melody part of the song plays when the client's fingers warm up and the accompaniment joins in when arousal is decreased. The training goal is to let the piece of music play with all the instruments. The animation plays when this happens.



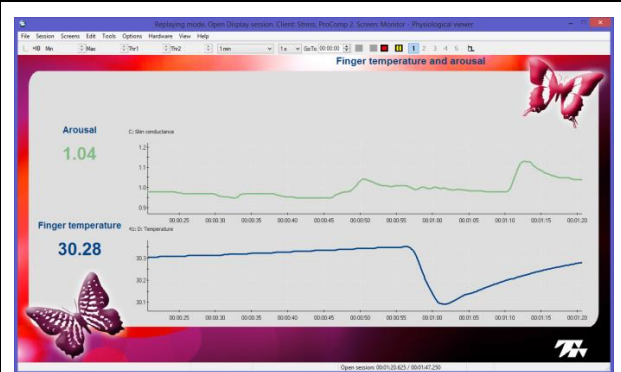
### Reviewing the session and generating a report

If you save the recorded feedback sessions, you can review them to see what happened while the client was practicing relaxation and following your coaching suggestions. BioGraph Infiniti automatically loads three reviewing screens. All three report screens allow you to generate Text reports but there is no Excel report for training sessions.

[Reviewing a session](#) is described more fully on page 16, and [generating a session report](#) is described on page 17.

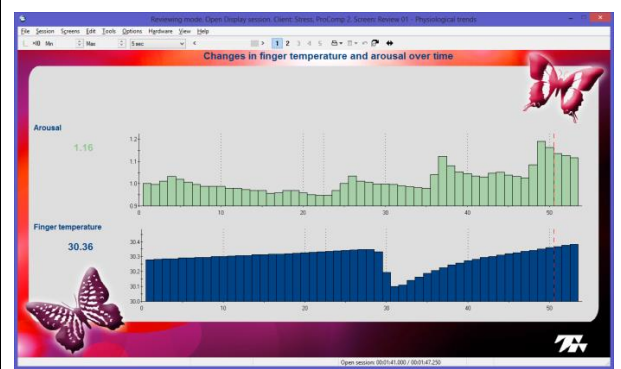
### Monitor – Physiological viewer

The physiological viewer screen shows the signal graphs for the whole training session. You can use it to look at the data that was recorded and see what happened during the session. If you have toggled between training screens during the session, you will see vertical lines along the recording each time you switched to another screen. You can click, hold and drag the Time Mark back and forth to see what the skin conductance and temperature values were at any given moment of the session.



### Review 01 – Physiological trends

This screen shows trend graphs for both signals which plot periodic mean values calculated every 20 seconds. The Trend graphs are useful to see long term changes without the moment by moment variations. You can click, hold and drag the cursor in the scroll bar at the top of the screen to move the Time Mark back and forth and see the means corresponding to each bar.





## Review 02 – Physiological trends & statistics

This screen shows trend graphs for both signals as lines instead of bars and shows whole session statistics at the top of the screen. You can click, hold and drag the cursor in the scroll bar, in the Tool Bar at the top, to move the Time Mark back and forth and see the mean values corresponding to each bar.



## Third step: Learning relaxation

After you have identified key areas of concern in your client's physiological response to stress and have performed a few biofeedback sessions with him, you can use the biofeedback-driven relaxation exercises to help your client learn simple relaxation techniques. These exercises include guided relaxation, relaxation with paced breathing and relaxation with binaural beat audio entrainment.

Relaxation can be achieved using many different methods. There are many commercial tools, available on the market, which propose to help the user relax and let go of stress, anxiety and tension. Most of these tools do not provide an objective means of verifying if relaxation actually occurs during the exercise.

The Stress Control Suite includes three relaxation tools which induce relaxation using an audiovisual guiding method while giving audio feedback to the client. This engages him more fully in the process because he gets immediate confirmation of whether the exercise is working or not. All your client has to do is to sit back, listen to the audio indications and let himself be led into a deeper and deeper state of relaxation.

We recommend that you connect headphones to the computer and let the client use them when practicing these relaxation exercises. It also helps if you can have the client recline and if you can dim the lights in the biofeedback room during the exercises. Each exercise takes 14 minutes to run and you can have your client try them one at a time – not necessarily during the same visit - and decide if he prefers any of them. He can then practice with that one during subsequent visits.

## Running a relaxation exercise session

1. Launch BioGraph Infiniti and click on **Quick Start**.
2. In the **Clients** list on the left, select your client's name from the list.
12. If the list on the right is empty, click the **Categories** drop-down list and select the correct category for your encoder:
  - **Stress Control – ProComp2**
  - **Stress Control – ProComp Devices** (use this category with the ProComp5 and ProComp Infiniti encoders)



Clients:

Full Name	ID Number	Clinic ID
Ballance, Tara	1	
Florimond, Dorian	2	
Dorimond, Florian	3	
Shores, Lajolla	4	
Keyes, Florida	8	

Categories

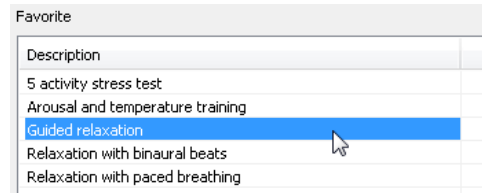
Stress Control - ProComp 2

Categories

Stress Control - ProComp Devices

3. In the list of **Favorites**, select a relaxation exercise.


- **Guided relaxation.**
- **Relaxation with binaural beats.**
- **Relaxation with paced breathing.**



4. Click **OK**.

5. Ensure that:

- The sensors are properly hooked up on the client.
- The device is properly connected to the PC.
- Your encoder is turned ON (ProComp2: green light is on; ProComp5 or ProComp Infiniti: blue light is on).

6. Click the **Start** button  to start the session, and follow the instructions in the appropriate **Screen sequence**.

- [Guided relaxation](#) starting on page 26.
- [Relaxation with binaural beats](#) starting on page 29.
- [Relaxation with paced breathing](#) starting on page 31.

7. When the script ends, click **Yes** to save the session.

## Guided relaxation

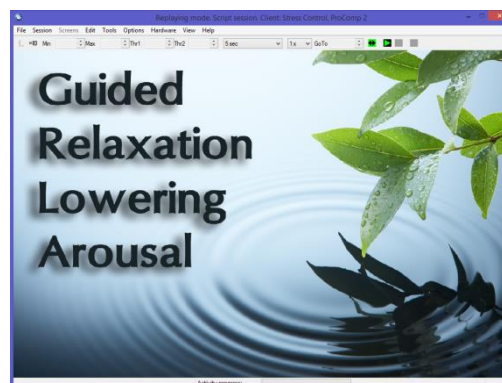
The guided relaxation method uses verbal instructions to teach the client to pay attention to his body and consciously relax his muscles, going from his head to his toes. The session is composed of three stages. During the induction period (7 min 42 sec), the speaker guides the client to go into deeper and deeper relaxation. The relaxation “integration” period (4 min 35 sec) provides no verbal guidance but allows the client to develop awareness of the state of relaxation while listening to proportional feedback tones. During the third period (1 min 43 sec), the speaker guides the client to return to full awareness using positive affirmations.

### Screen sequence for guided relaxation

#### Introduction screen

When you launch the guided relaxation session, after selecting a client and clicking **OK**, the introduction screen appears.

Describe what the exercise is about to your client and click the **Start** button when your client is ready to go.

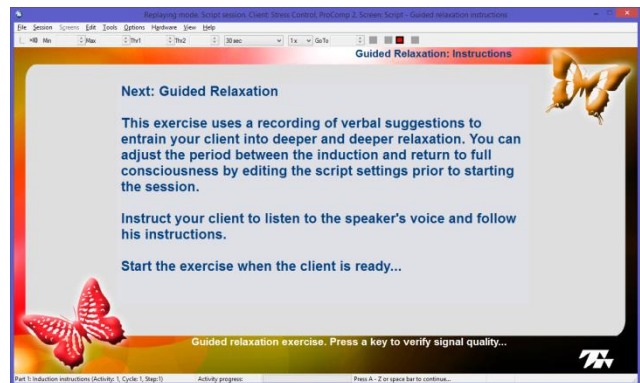




### Instruction screen

The instruction screen describes the next step of the exercise, which consists of a period of verbal induction during which the speaker will guide the client into deep relaxation.

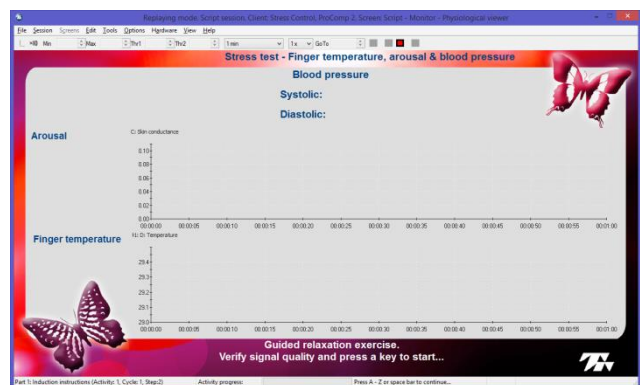
Explain this to your client and press the **Space bar** to continue.



### Signal verification

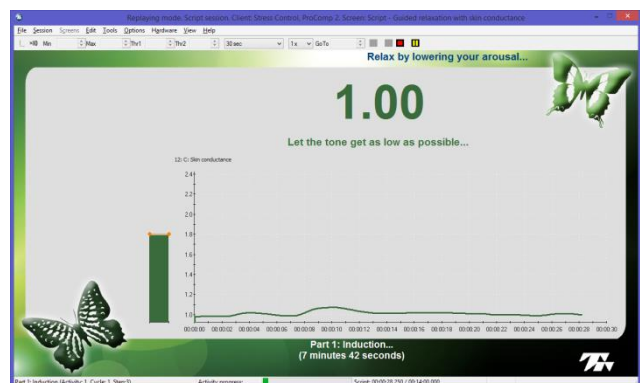
As always, prior to starting a recording, it is a good idea to verify if the sensors are placed on the client correctly and that the physiological signals you are recording are of good quality.

Press the **Space bar** to continue.



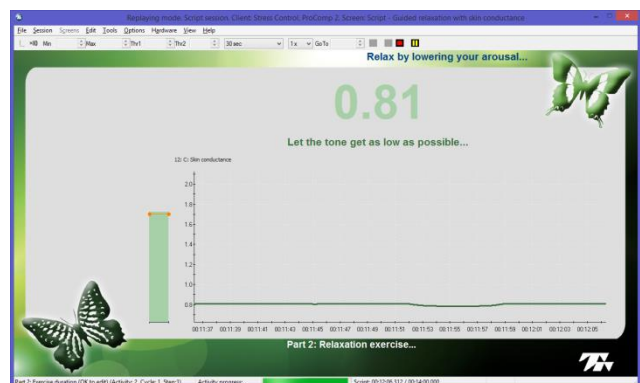
### Relaxation induction period screen

Feedback during the guided relaxation exercise is done using a variation on the Training 01 screen, relaxation with arousal. This version of the screen only gives proportional tone feedback.



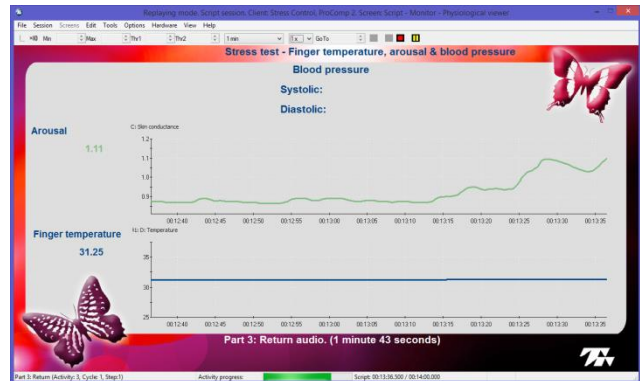
### Relaxation integration period screen

No verbal instructions are given during this phase of the exercise. The client has to listen to the proportional audio tones. This period starts as soon as the audio recording ends.



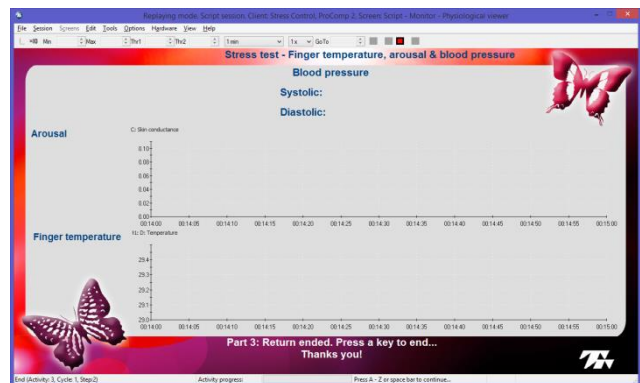
### ***Return to awareness period screen***

The last phase of the exercise starts when the verbal instructions start again. The speaker proceeds to bring the client back to full awareness. The screen changes to the physiological monitor screen and feedback stops.



### ***Return to awareness period screen***

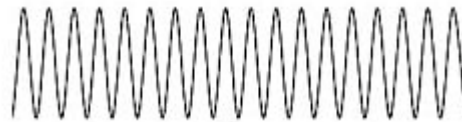
At the end of the exercise, the software pauses and waits for you to press a key (**A-Z** or **Space bar**) to continue and save the data.



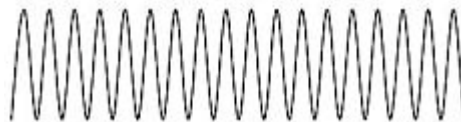
### **Relaxation with binaural beat entrainment**

The relaxation with binaural beat entrainment exercise induces a deep relaxation using an auditory technique which consists of playing two sine wave tones, generated with slightly different frequencies. The slight difference creates an oscillating effect at a specific and desired frequency. For this exercise, the software generates a tone of a base frequency set to 300 Hertz and another tone with a frequency equal to the base frequency plus an offset value which is generally within the alpha frequency range (8-12 Hz) of the electroencephalography (EEG) spectrum because alpha frequency brainwaves are generally dominant when a person is relaxed.

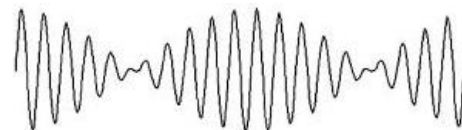
**Base tone (300 Hz):**



**Base + offset frequency tone (308 Hz):**



**Resulting binaural beat tone (8Hz):**



When the client listens to the two tones through headphones, one on each audio channel, he perceives a third frequency equivalent to the difference between the two tones. This frequency tends to make a throbbing sound called a binaural tone. The binaural tone is believed to promote relaxation as the brain responds to its frequency.

This exercise uses a dynamic tone generator to adjust the difference between the two tones on the fly in three distinct periods:

- Phase 1 takes the client from a binaural tone frequency of 20 Hertz, all the way down to 8 Hertz.
- Phase 2 maintains the beats at 8 Hertz for a while.
- Phase 3 then brings the binaural beats from 8 Hertz up to 15 Hertz and slowly fades out.

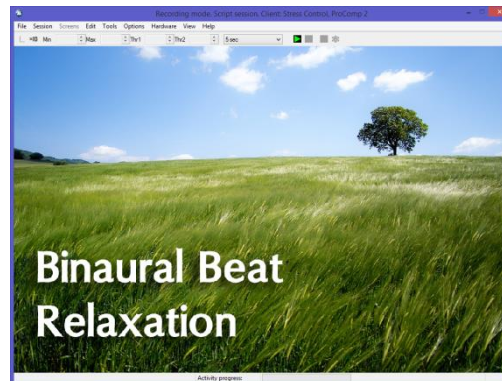
The exercise takes 14 minutes and should be practiced in conditions similar to what was described for the previous exercise.

## Screen sequence for binaural beat entrainment

### Introduction screen

When you launch the binaural beat relaxation session, after selecting a client and clicking **OK**, the introduction screen appears.

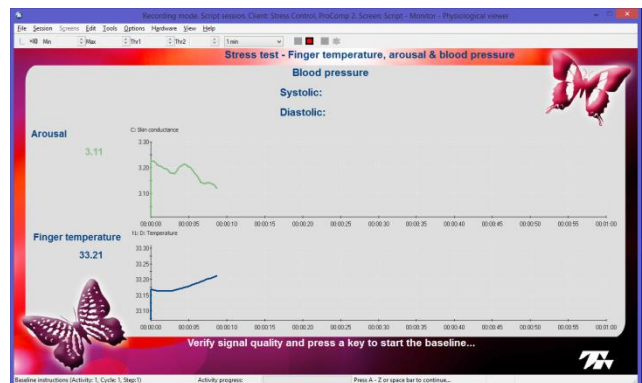
Describe what the exercise is about to your client and click the **Start** button when your client is ready to go.



### Signal verification

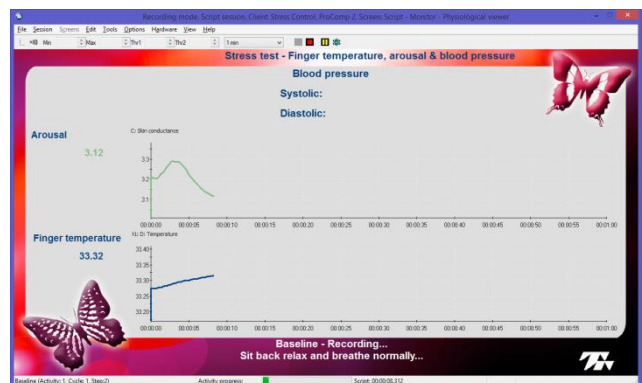
The signal verification step allows you to check that the sensors are placed on the client correctly and that you are seeing valid physiological measures.

Press the **Space bar** to continue.



### Baseline recording

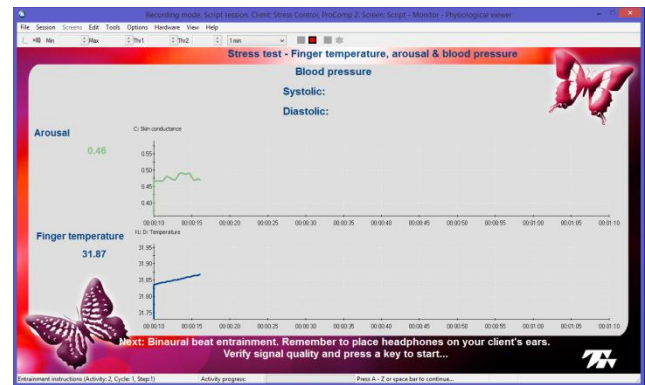
The baseline recording step takes 2 minutes. Remind the client that he should remain quiet and breathe normally.



### Signal verification

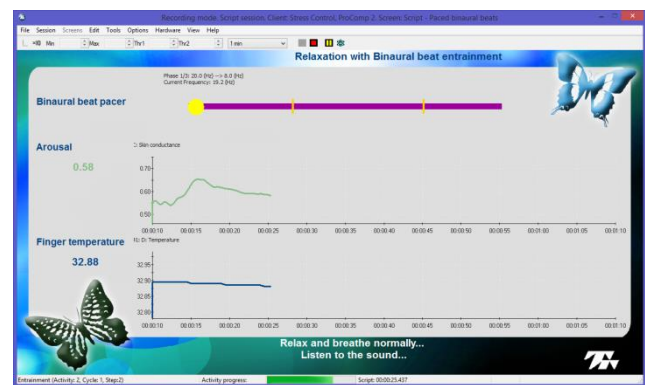
Once more, you can check that the sensors are placed on the client correctly and that you are seeing valid physiological measures.

Press the **Space bar** to continue.



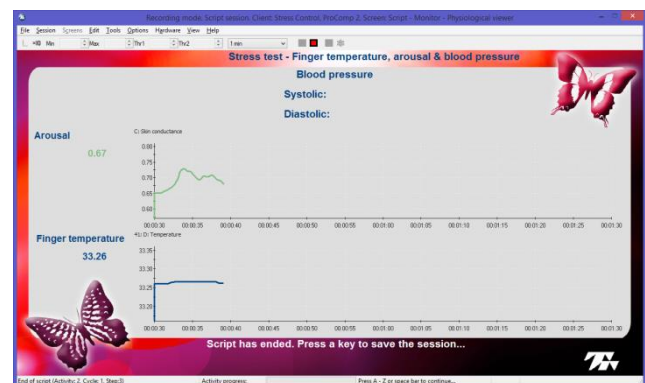
### Binaural Beat Relaxation step

The binaural beat relaxation screen shows the binaural beat pacer at the top of the screen. As the session advances, the yellow guide dot will move along the purple line. The two orange markers indicate the transition points between Phase 1, 2 and 3. Arousal and temperature signals can be seen moving across line graphs below the pacer.



### End of script

Thank the client for doing a good job, unhook the sensors carefully and ask for feedback and insights.



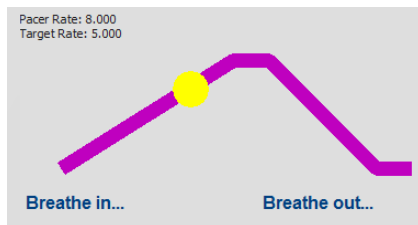
### Relaxation with paced breathing

Slow diaphragmatic breathing exercises are commonly taught in many stress management classes because they naturally promote relaxation. For this exercise to be done properly, you have to teach your client to breathe with his abdomen, instead of with his chest or shoulders. Have him place a hand, flat over his belly button, to feel the breathing movement and help him become aware of any chest expansion or shoulder movement.

When teaching your client to breathe abdominally, pay particular attention to how deeply he is breathing. Breathing too deeply can lead to over breathing and make him feel dizzy. Have the client reduce the depth of his breathing until it becomes slightly uncomfortable and then increase the depth of his breaths just enough to be comfortable again. Have him practice breathing like this on his own before starting with the exercise.



The relaxation with paced breathing exercise uses a breathing pacer which guides the client to breathe in and out at a specific rate. The pacer shows a guiding dot moving along a line which goes up for breathing in, and down for breathing out. The flat part between the in and out breaths indicates a short period of holding the breath in. The pacer plays inhalation and exhalation sounds, so the client can close his eyes if this is more comfortable.



The pacer is set to start pacing at 8 breaths per minute and slowly reduces its rate to 5 breaths per minute. Once at that rate, it stays there until the end of the exercise.

### Screen sequence for relaxation with paced breathing

#### Introduction screen

When you launch the relaxation with paced breathing session, after selecting a client and clicking **OK**, the introduction screen appears.

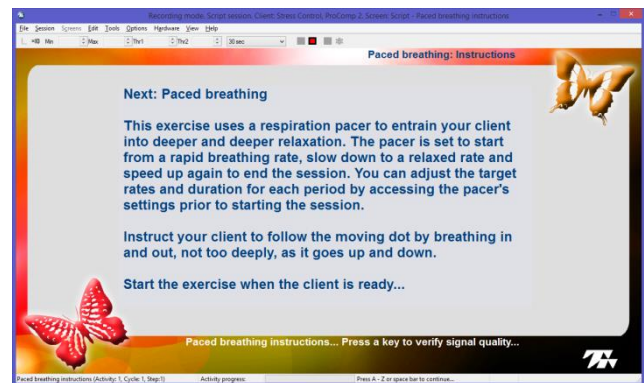
Describe what the exercise is about to your client and click the **Start** button when your client is ready to go.



#### Instruction screen

The instruction screen describes the next step of the exercise, which consists of breathing slowly and not too deeply, following the guiding dot on the screen (inhale when it goes up, exhale when it goes down).

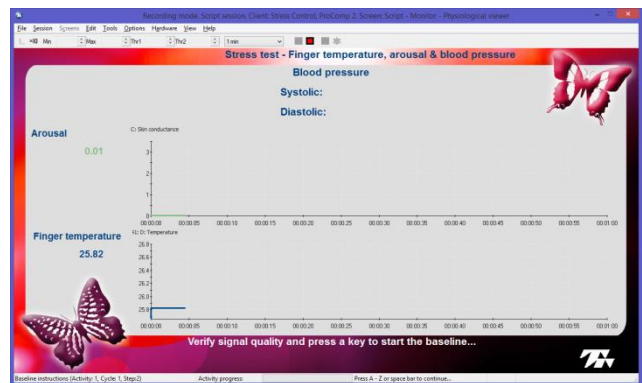
Explain this to your client and press the **Space bar** to continue.



### Signal verification

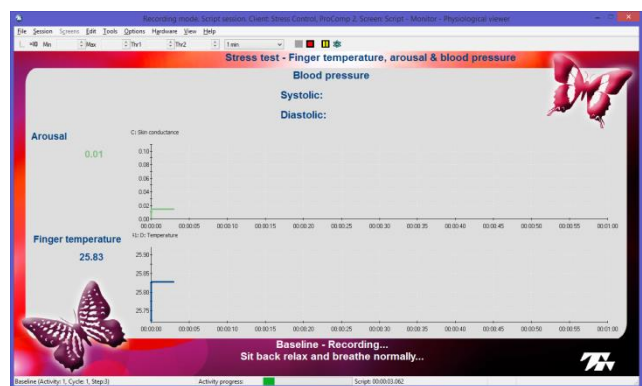
As always, prior to starting a recording, it is a good idea to verify if the sensors are placed on the client correctly and that the physiological signals you are recording are of good quality.

Press the **Space bar** to continue.



### Baseline recording

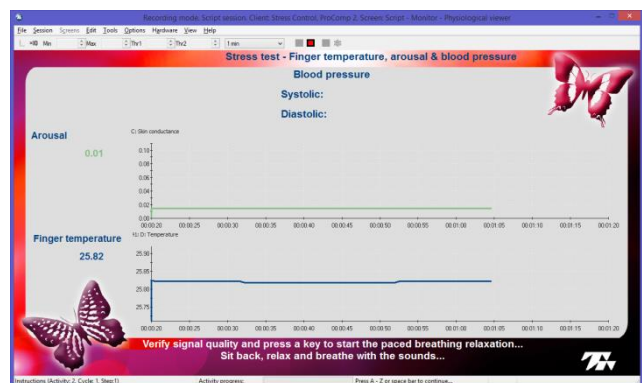
The baseline recording step takes 2 minutes. Remind the client that he should remain quiet and breathe normally.



### Signal verification

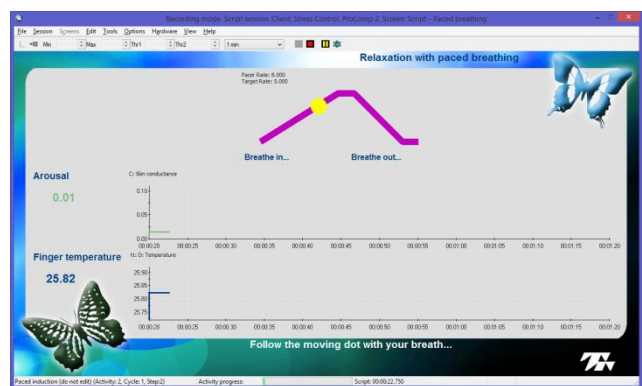
Once more, you can check that the sensors are placed on the client correctly and that you are seeing valid physiological measures.

Press the **Space bar** to continue.



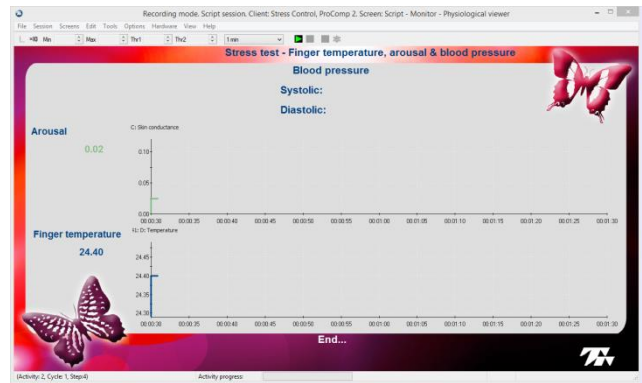
### Paced breathing relaxation step

When this screen appears, your client should be sitting back comfortably and progressively adjust his breathing with the yellow guiding dot. Tell him to follow it as closely as possible but that it is OK to make mistakes. The goal is to relax. If the client reports anxiety, verify that he is breathing deeply enough to get the oxygen he needs but not so deeply that he is over breathing. Try increasing or decreasing the depth of his breaths.



### End of script

When the exercise ends, thank the client for doing a good job, unhook the sensors carefully and ask for feedback and insights.



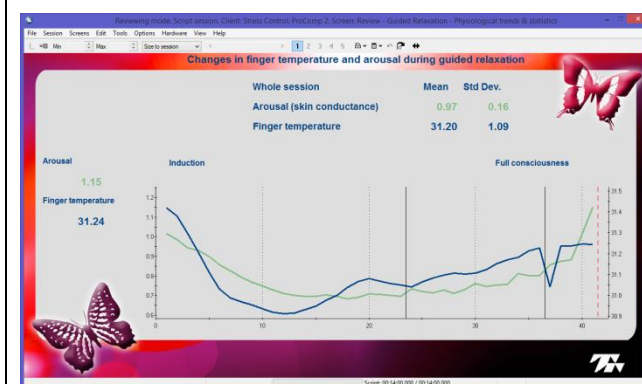
### Reviewing the session

If you save the recorded relaxation sessions, you can review them to see what happened while the client was practicing relaxation. When reviewing a guided relaxation session, the screen indicates where the three periods start so you can observe the changes that happened during the whole exercise.

[Reviewing a session](#) is described more fully on page 16.

### Guided relaxation review screen

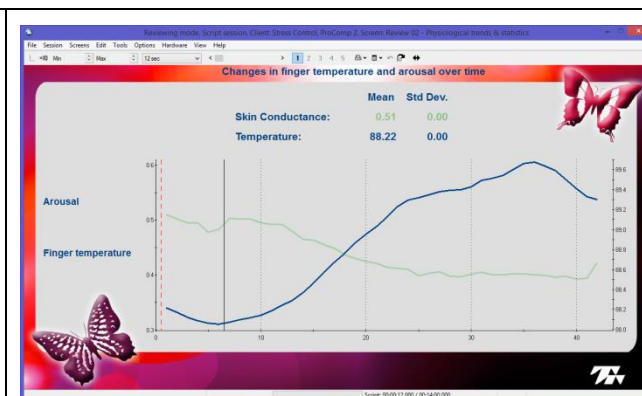
The screen shows trend graphs (averaged) of the changes in arousal (skin conductance) and temperature over time. Activity markers (black vertical lines) separate the 3 periods so you can see how signals changed during the relaxation exercise, the integration period and the return to awareness. Along the top, you can see session statistics.



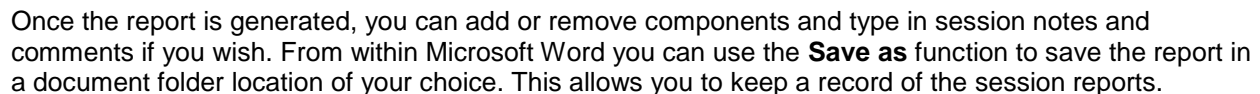
When reviewing sessions done with the other two relaxation exercises, the screen shows the difference between the baseline period and the relaxation period.

### Guided relaxation review screen

The screen shows trend graphs (averaged) of the changes in arousal (skin conductance) and temperature over time. Activity markers (black vertical lines) separate the baseline from the relaxation period, so you can see the effect of practicing the technique. Along the top, you can see session statistics.



As with the 5 activity stress test and the biofeedback sessions, you can generate a text report for these sessions by clicking the Session Report button in the Tool Bar at the top. The Text Report dialog box offers a selection of report components that you can include or exclude by selecting appropriate check boxes. The example below shows client information contained in the header as well as session statistics and session Trend Graphs.



## What's next?

## Biofeedback and guided relaxation

- [www.thoughttechnology.com](http://www.thoughttechnology.com): Thought Technology Ltd.

Consider the Neuro-Programmer 3 software, developed by Transparent Corporation. This low cost software allows your client to program binaural tone relaxation sessions which they can enjoy at home.

- ### Paced breathing relaxation

- [www.bfe.org](http://www.bfe.org): Biofeedback Federation of Europe.



#### Recommended reading on biofeedback

- ***Biofeedback Mastery: An Experiential Teaching and Self-Training Manual. Association for Applied Psychophysiology and Biofeedback.*** 2008-05-18. Peper et al. ISBN: 978-0984297900
- ***The Clinical Handbook of Biofeedback. A Step-by-Step Guide for Training and Practice with Mindfulness.*** Wiley-Blackwell. 2013. Inna Z. Khazan. ISBN: 978-1-119-99371-1
- ***Biofeedback: A Practitioner's Guide, Third Edition. The Guilford Press. 2005.*** Mark S. Schwartz, PhD, Frank Andrasik, PhD. ISBN: 978-1593852337

## Technical Specifications and Support

### Technical specifications

#### ProComp2 (SA7400)



Size (approx.)	2 ½ " x 2 3/16" x 5/8" (64mm x 56mm x 16mm)
Weight (approx., without batteries)	40 g
Input impedance (Input A)	1,000,000 mΩ
Input impedance (Input B, C, D)	2 mΩ
Resolution (Input A only)	0.1 μV RMS
Signal input range (Input A)	0-200 μV RMS
Signal input range (Input B, C, D)	2.0V – 3.6V
CM RR (Input A)	-130 @ 2 Hz to 45 Hz
Channel bandwidth	0 Hz – 45 Hz
Sample rate /channel (A, B)	200 or 256 samples/second
Sample rate /channel (C, D)	20 or 32 samples/second
Supply voltage	1.0V – 1.6V
Current consumption	75 mA - 150 mA @ 1.5 V
Battery life (Alkaline )	10 Hours (minimum)
Low battery warning	1.1 V ± 0.2 V
Data output protocol	19.2 or 38.4 Kbaud, 8 Bits, 1 Stop, No Parity
Analog to digital conversion	13 bits
System accuracy	+/- 5%

#### ProComp5 Infiniti (SA7525) and ProComp Infiniti (SA7500)



**ProComp5 Infiniti**



**ProComp Infiniti**

Size (approx.)	5.1" x 3.7" x 1.5" (130mm x 95mm x 37mm)
Weight (approx.)	200g (7oz)
Power source	4AA batteries, single use alkaline or NiMh Rechargeable
Supply voltage	3.6V – 6.5V (fiber optic), minimum 4.0V (Compact Flash)
Battery life, Alkaline cells	30h typical, 20h minimum
Low-battery warning	20 – 30 minutes of battery life remaining
Sensor supply voltage	7.260V ± 2mV
ADC output	14bits
Full-scale input range, DC	2.8V±1.696V
LSB magnitude	207μV
Anti-aliasing filter	5th order Butterworth
Alias rejection	30dB typical

Encoder channel bandwidth (3dB) and sample rate	DC – 512Hz @ 2048 samples/second DC – 64Hz @ 256 samples/second DC – 64Hz @ 200 samples/second DC – 8Hz @ 32 samples/second DC – 8Hz @ 20 samples/second
DC gain accuracy	±0.5% (initial, or after self-calibration)
DC offset	±3LSB (initial, or after self-calibration)
Overall system accuracy	5%
Offset drift, calibration temperature ±10C	±5 LSB
Encoder noise	150µVRMS, 1mV p-p typical, offset removed
Temperature (operation)	+10C – +40C
Humidity (non-condensing)	10% – 90%
Atmospheric pressure	700 – 1060 KPa

#### Skin Conductance Flex/Pro Sensor (SA9309M)



Size without electrode leads (approx.)	3.5 cm (1.4")
Size with electrode leads (approx.)	15 cm (6.0")
Cable length (approx.)	127 cm (50")
Weight (approx.)	25 g (1 oz)
Signal input range	0 – 30.0 µS
Accuracy	±5% and ±0.2 µS

#### Skin Temperature Sensor (SA9310M)



Length (approx.)	152cm (60")
Weight	10g (0.33oz)
Temperature range	10°C - 45°C (50°F – 115°F)
Accuracy	±1.0°C, 20°C – 40°C (±1.8°F, 68°F – 104°F)

**Note:** The encoder and its sensors are sensitive electronic instruments and should be handled as such. Be especially careful to avoid both pulling on the electrode cable and getting moisture or electrode gel on the sensor snaps. If necessary, wipe the surface with a damp cloth or use a moistened Q-tip to remove gel from inside the sensor snaps. Wipe with a dry cloth.

## Ordering and Support

### Placing Orders

#### **Outside USA**

Tel: 1-514-489-8251

Fax: 1-514-489-8255

#### **In USA Toll-Free**

Tel: 1-800-361-3651

E-Mail: [mail@thoughttechnology.com](mailto:mail@thoughttechnology.com)

Or contact your local authorized distributor.

### Technical Support

#### **Outside USA**

Tel: 1-514-489-8251

Fax: 1-514-489-8255

#### **In USA Toll-Free**

Tel: 1-800-361-3651

E-Mail: [techsupport@thoughttechnology.com](mailto:techsupport@thoughttechnology.com)

Or contact your local authorized distributor.

## Warranty

The hardware (encoder and sensors) is guaranteed to be free from defects in material and workmanship for 1 year from the date of purchase.

In the unlikely event that repair is necessary, contact Thought Technology Ltd. to receive a Return Authorization number. Then send the unit back by a traceable method. Thought Technology will not be responsible for items not received. We will repair or replace your unit(s) that are still under warranty free of charge.


This warranty does not apply to damage incurred through accident, alteration, or abuse.

This warranty does not cover damage to the encoder or the temperature and skin conductance sensors caused by obvious mechanical mistreatment of the system.

## Returning Equipment for Repair

Before returning the equipment, please contact first our service department and get an authorization number (RA number).

 Canada and International +1 514 489-8251

 USA 1-800-361- 3651



[service@thoughttechnology.com](mailto:service@thoughttechnology.com)

Then fill in the return form (the form can be found at the end of the manual). You must provide a detailed description of the problem you are experiencing, and your telephone/fax number and e-mail.

The unit(s) must be sent **postage prepaid** and **insured**, with proof of purchase to one of the addresses below.

All customs and duties charges will be billed to the customer if incurred by sending the unit to the **wrong** address.

<p><b>In the USA</b>, ship insured to:</p> <p>Thought Technology Ltd. Cimetra LLC 8396 State Route 9 West Chazy, New York 12992, USA</p>	<p><b>In Canada</b>, ship insured to:</p> <p>Thought Technology Ltd. 8205 Montreal/ Toronto Blvd. Suite 223 Montreal West, Quebec Canada H4X 1N1</p>	<p><b>For international</b>, ship insured to:</p> <p>Thought Technology Ltd. 8205 Montreal/ Toronto Blvd. Suite 223 Montreal West, Quebec Canada H4X 1N1</p> <p>Package must be marked "Broker: Livingston International - 133461".</p>
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## Repair Return Form

Be sure to call for authorization before returning any equipment!

Copy and complete this form and include it with the unit(s).

Include a copy of the original invoice and return to the address in the Returning Equipment section.

**Name**

---

**Company**

---

**Address**

---

---

---

**Phone No.**

---

**Fax No.**

---

**Date Purchased**

---

**From Whom**

---

**Model Name**

---

**Serial No.**

---

**Problem**

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