Rehab SUITE™

Software Overview

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For use with BioGraph version 5.0 or later

TABLE OF CONTENTS

Introduction

Welcome to the user manual for Rehab Suite. This manual provides information intended to help you get the most out of your system.

The manual is organized into chapters as follows:

- **Installation and System Requirements** lists the computer requirements recommended for running the software.
- **First Time Run** explains how to start the software and verify its settings prior to using it for the first time.
- **Hardware Set-up** provides general information about the encoder, sensors and accessories included in the system. It also shows how to connect the hardware elements.
- **Software Overview** introduces the main functions of the BioGraph Infiniti software: recording, replaying, and reviewing sessions. It discusses the analytical processes of artifact rejection, statistics calculation, and report generation. In addition this section explains how to use a web camera with the software, how to calibrate and zero sensors, and how to run an impedance check.

The next chapters explain the protocols run by the system. These are:

- **General SEMG Assessment**
- **Static SEMG Assessment**
- **Dynamic SEMG Assessment**
- **Muscle Fatigue Monitoring**
- **SEMG Biofeedback**
- **Respiration Training**
- **Heart Rate Monitoring and HRV**
- **Skin Conductance & Temperature Biofeedback**
- **Static Range of Motion Assessment**
- **Dynamic Range of Motion Assessment**
- **Range of Motion Training**
- **Manual Muscle Testing**
- **Algometry**

Each protocol chapter presents the general principles of one specific protocol. It lists relevant references in the clinical guide. It provides step-by-step instructions for running the protocol. Finally, it describes how to generate a report.

This document is a brief overview of the exciting features in Rehab Suite. Detailed information is provided in the suite manual upon purchase of the product.

Installation and System Requirements

If BioGraph Infiniti is not already set up on your computer, please follow the Installation Instructions provided to install the program.

Make sure that your computer meets the following requirements before you install the BioGraph Infiniti software:

- **Intel® Pentium® 4, Intel Centrino®, or Intel Core™ Duo (or compatible) processor, AMD Athlon™ XP, AMD Turion™ 64 X2 Dual-Core Mobile Technology, AMD Turion™ 64 Mobile Technology, AMD Athlon™ 64 FX, AMD Athlon™ 64 (or compatible) processor.**
- **Microsoft® Windows® XP Professional or Home Edition with Service Pack 2 or Windows Vista™ Home Basic, Home Premium, Business, Ultimate, or Enterprise (certified for 32-bit editions).**
- **50 - 60 gigabytes hard disk space for video recording and processing. (The software needs 2.5 gigabytes available hard drive space to install and run.)**
- Minimum RAM: 1 GB (Windows XP) or 2 GB (Windows Vista)
- **CD ROM or DVD drive.**
- **Video Card (minimum XGA, 1,024x768 monitor resolution).**
- **32 bit compatible sound card & speakers.**
- **1 USB port.**
- **Mouse or compatible pointing device.**
- Microsoft Office Basic (for report generation and printing)
- **Webcam 30 frames per second (for video purposes only).**
- **DirectX 9c or later** (if this is missing, it will be installed with BioGraph Infiniti)**.**

PLEASE NOTE:

- *When using Windows Vista™ Home Basic or Business, additional codecs must be installed to view camera and DVD.*
- *Low speed CPUs (1.6 GB or less) may be sluggish when running screens with multiple instruments.*

General SEMG Assessment

OVERVIEW

The following protocols are very common SEMG assessment techniques. They can be performed at the beginning of each visit. They allow you to quickly assess the examinee's muscle condition and determine the training parameters of the day (since an examinee's condition can change over time).

This logo on a screen in a protocol indicates that you can use an optional webcam with the screen to record video of the session. You need only connect your webcam to a USB port of your computer and turn it on before you start the session.

***Note**: Your computer system must be connected to a video capture device, such as a webcam, and the proper software installed, in order to use this function.*

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations for the accurate use of the instrumentation. It also explains how to prepare the examinee and the procedure to follow.

Chapter: SEMG ASSESSMENT; **section:** SEMG SIGNAL ANALYSIS: GENERAL CONCEPTS

Also recommended:

- INTRODUCTION TO SURFACE ELECTROMYOGRAPHY
- SKELETAL MUSCLE PROPERTIES

GENERAL PROCEDURE

Starting the Session

If you are going use a webcam to make a video recording of this session, connect your webcam to a USB port of your computer and turn it on.

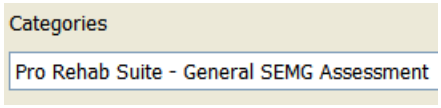
- Connect the sensors to the encoder as follows:
  - **MyoScan/MyoScan-Z sensor** to **channel A**.
  - Optional **MyoScan/MyoScan-Z sensors** to **channel B,** and **channels C to J** for FlexComp Infiniti.

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Myo	**Myo** *(optional)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*

- Turn the encoder on.

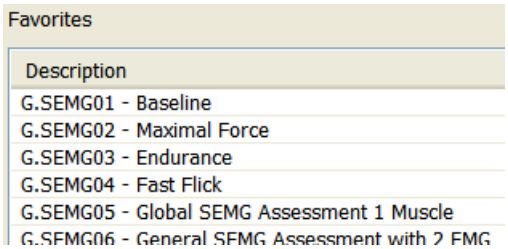
1. Click **Quick Start**.

2. From **Categories**, select **Pro/Flex Rehab Suite - General SEMG Assessment**.



3. From **Clients**, select a name.

4. From **Favorites**, select the desired Assessment Protocol.
5. Click **OK**.



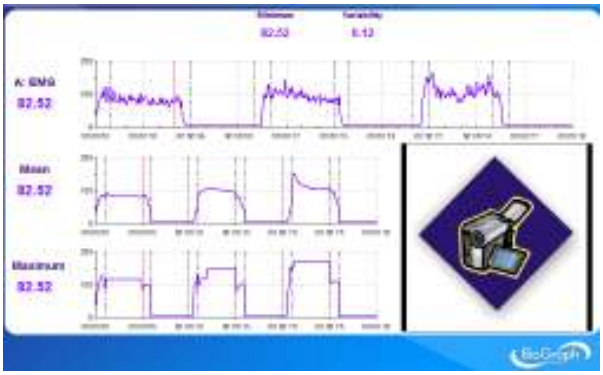
Measuring

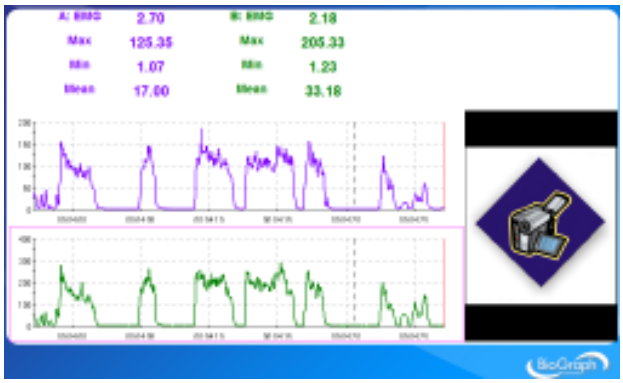
- Click the **Start** button  .

Reviewing the session

When the session ends, a series of message prompts guides you through the process of saving data, adding notes to the session file, and switching to reviewing mode so that you can generate a session report.

In review mode, a screen similar to this will appear:





If you used a webcam to make a video recording of the session, during review the video playback is synchronized to the EMG signal as you move the Time Mark back and forth along the EMG signal line graph.

Generating a report

- After the review screen opens, you can generate a Dynamic SEMG Assessment report. This is a Text report.

1. Click the **Session Report** icon  in the tool bar.
2. Select **Generate Text Report**, **s**elect report components in the **Session Report window**, and click **Generate Report**.

   Microsoft WORD opens and displays your report. You can print or save the report using WORD's **Print** and **Save** functions.

G.SEMG01 – BASELINE ASSESSMENT

This protocol measures the resting level of the muscle. The patient must be asked to totally relax the muscle.

G.SEMG02 – MAXIMAL FORCE ASSESSMENT

This protocol measures the maximal force of the muscle. The maximal force is the highest level of voluntary contraction that a person can achieve without inducing unacceptable pain.

G.SEMG03 – ENDURANCE ASSESSMENT

This protocol assesses a sustained contraction. The patient contracts as strongly as they can during an extended period (about 20 seconds). This monitors the recruitment of the slow twitch fibers (muscle endurance). The contraction should be performed against static resistance (isometric contraction).

G.SEMG04 – FAST FLICK ASSESSMENT

This protocol measures the maximal force of the muscle. The maximal force is the highest level of voluntary contraction that a person can achieve without inducing unacceptable pain.

G.SEMG05 – GLOBAL SEMG ASSESSMENT 1 MUSCLE

This is a complete assessment of the muscle with 5 activities: pre baseline, fast flicks (rapid contractions), work/rest (maximal force), endurance and post baseline.

SEMG ASSESSMENT – GENERAL PURPOSE (G.SEMG06 and up)

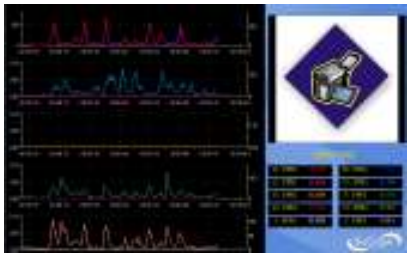
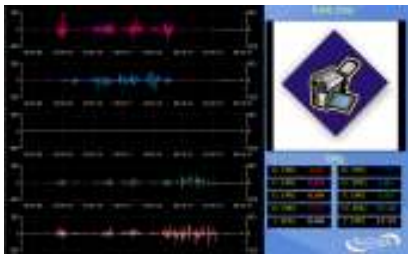
This section regroups generic display screens designed for SEMG Assessment. As opposed to the protocols above, here there is no sequence of actions and limitation of time.

G.SEMG06 - SEMG Assessment with 2 EMG

G.SEMG07 - SEMG Assessment with 4 EMG (FlexComp Infiniti only)

G.SEMG08 - SEMG Assessment with 6 EMG (FlexComp Infiniti only)

G.SEMG09 - SEMG Assessment with 10 EMG (FlexComp Infiniti only)

General Purpose – 10 EMG RMS with video 1 2 3 4 5 10 RMS EMG signals are displayed on 5 line graphs.	
General Purpose – 10 raw EMG with video 1 2 3 4 5 10 raw EMG signals are displayed on 10 line graphs. The digital displays show RMS EMG.	

These screens are also used for review.

Static SEMG Assessment

OVERVIEW

Static SEMG Scanning assesses the resting level of the muscles surrounding the spine in static position. The protocol scans 12 sites x 2 (left/right) from C2 to L5.

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations for the accurate use of the instrumentation. It also explains how to prepare the examinee and the procedure to follow.

Chapter: SEMG ASSESSMENT; **section:** STATIC SEMG ASSESSMENT

Also recommended:

- INTRODUCTION TO SURFACE ELECTROMYOGRAPHY

PROCEDURE

Starting the Session

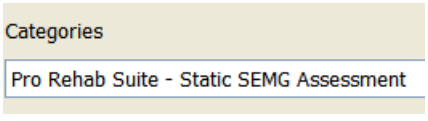
- Connect the sensors to the encoder as follows:
  - **MyoScan or MyoScan-Z sensors** to **channels A and B** (left in A, right in B);
  - **Foot pedal** to **channel C**.

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Myo *(left)*	**Myo** *(right)*	**Pedal**							

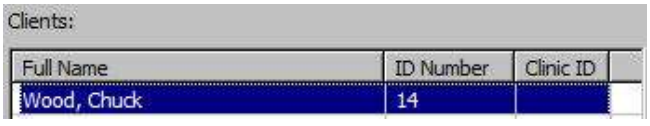
- Turn the encoder on.

1. Click **Quick Start**.

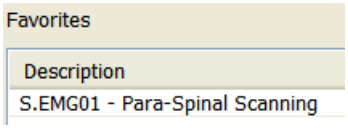
2. From **Categories**, select **Pro/Flex Rehab Suite - Static SEMG Assessment**.



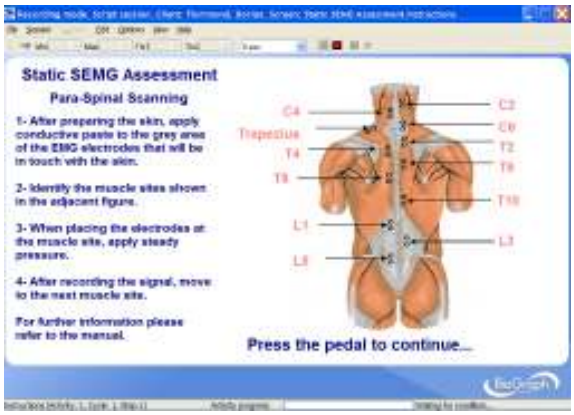
3. From **Clients**, select a name.



4. From **Favorites**, select **S.EMG01 – Para-Spinal Scanning**.
5. Click **OK**.



- Click the **Start** button  and read the instructions on the screen. **Do not press the foot pedal yet**.



- Put conductive electrode paste or cream on the EMG electrodes (grey area only).
- Position yourself next to the examinee, the encoder attached to your belt, with the pedal near your foot.
- Press the foot pedal to go to the next screen.

Measuring

1. Place the active electrodes (positive and negative) in alignment with the spine (except for trapezius), at a distance of 3 cm out from the vertebral ridge, and at the site shown on the screen.

Dynamic SEMG Assessment

OVERVIEW

Dynamic SEMG assesses muscle tension through various movements, such as flexion/extension, lateral flexion or rotation.

In addition to general protocols, the system provides three assessment protocols for the **cervical spine** (CP, SCM or Traps) and for the **lumbar spine**:

- Flexion/Extension
- Left/Right Lateral Flexion
- Left/Right Rotation

It also provides one assessment protocol for the **anterior knee** (VMO and VL).

This logo on a screen in a protocol indicates that you can use an optional webcam with the screen to record video of the session. You need only connect your webcam to a USB port of your computer and turn it on before you start the session.

***Note**: Your computer system must be connected to a video capture device, such as a webcam, and the proper software installed, in order to use this function.*

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations for the accurate use of the instrumentation. It also explains how to prepare the examinee and the procedure to follow.

Chapter: SEMG ASSESSMENT; **section:** DYNAMIC SEMG ASSESSMENT

Also recommended:

- INTRODUCTION TO SURFACE ELECTROMYOGRAPHY
- SKELETAL MUSCLE PROPERTIES

GENERAL PROCEDURE

Starting the Session

If you are going use a webcam to make a video recording of this session, connect your webcam to a USB port of your computer and turn it on.

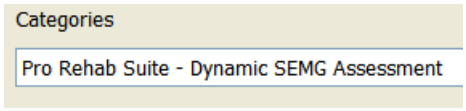
- Connect the sensors to the encoder as follows:
  - **MyoScan/MyoScan-Z sensors** to **channels A and B** (left in A, right in B).
  - Optional **MyoScan/MyoScan-Z sensors** to **channels C and D** (left in C, right in D).

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Myo	**Myo**	**Myo** *(optional)*	**Myo** *(optional)*						

- Turn the encoder on.

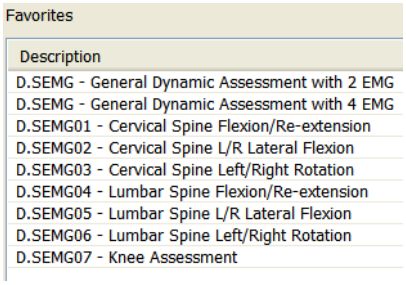
1. Click **Quick Start**.

2. From **Categories**, select **Pro/Flex Rehab Suite - Dynamic SEMG Assessment**.



3. From **Clients**, select a name.

4. From **Favorites**, select the desired General Dynamic Assessment Protocol.
5. Click **OK**.



Measuring

- Click the **Start** button  .

Mark the different stages of the movement with event makers (events can be marked by hitting the space bar or a key of the keyboard that you would have preliminarily labeled with the name of the event).

Reviewing the session

When the session ends, a series of message prompts guides you through the process of saving data, adding notes to the session file, and switching to reviewing mode so that you can generate a session report.

In review mode, a screen similar to this will appear:

If you used a webcam to make a video recording of the session, during review the video playback is synchronized to the EMG signal as you move the Time Mark back and forth along the EMG signal line graph. This allows you to see lateral deviations in the movement and to observe any antalgic position.

The review allows you to verify that the motion has been properly performed by the examinee at the right time, when prompted. You can also check the consistency from trial to trial.

Generating a report

- After the review screen opens, you can generate a Dynamic SEMG Assessment report. This is a Text report.

  1. Click the **Session Report** icon  in the tool bar.
  2. Select **Generate Text Report**, **s**elect report components in the **Session Report window**, and click **Generate Report**.

     Microsoft WORD opens and displays your report. You can print or save the report using WORD's **Print** and **Save** functions.

PROCEDURE FOR LUMBAR SPINE ASSESSMENT

PROCEDURE FOR CERVICAL SPINE ASSESSMENT

PROCEDURE FOR ANTERIOR KNEE ASSESSMENT

Muscle Fatigue Monitoring

OVERVIEW

SEMG can be used as an indicator of muscle fatigue. The following screens were designed for this purpose.

This logo on a screen in a protocol indicates that you can use an optional webcam with the screen to record video of the session. You need only connect your webcam to a USB port of your computer and turn it on before you start the session.

***Note**: Your computer system must be connected to a video capture device, such as a webcam, and the proper software installed, in order to use this function.*

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations for the accurate use of the instrumentation. It also explains how to prepare the examinee and the procedure to follow.

Chapter: SEMG ASSESSMENT; **section:** MUSCLE FATIGUE MONITORING

Also recommended:

- INTRODUCTION TO SURFACE ELECTROMYOGRAPHY
- SKELETAL MUSCLE PROPERTIES

GENERAL PROCEDURE

Starting the Session

If you are going use a webcam to make a video recording of this session, connect your webcam to a USB port of your computer and turn it on.

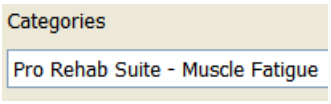
- Connect the sensors to the encoder as follows:
  - **MyoScan/MyoScan-Z sensor** to **channels A**.
  - Optional **MyoScan/MyoScan-Z sensor** to **channel B**.

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Myo	**Myo** *(optional)*								

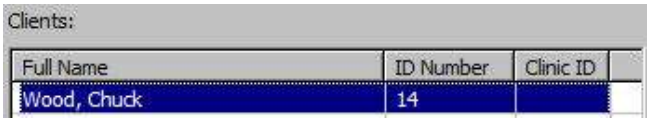
- Turn the encoder on.

1. Click **Quick Start**.

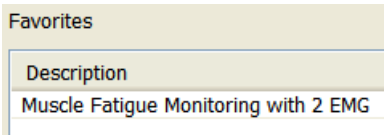
2. From **Categories**, select **Pro/Flex Rehab Suite – Muscle Fatigue**.



3. From **Clients**, select a name.



4. From **Favorites**, select **Muscle Fatigue Monitoring**.
5. Click **OK**.



Measuring

- Click the **Start** button  .

  You can view each screen by clicking on the numerical buttons on the toolbar at the top.

- To stop the session, click the Stop button: 

Review screen

The same screens are used for review.

All these screens are accessible from **Start Open Display Session** in the channel set "**SEMG Assessment with 2 EMG**".

SEMG Biofeedback

OVERVIEW

This section suggests several training screens that will enhance and speed up rehabilitation thanks to SEMG biofeedback.

This logo on a screen in a protocol indicates that you can use an optional webcam with the screen to record video of the session. You need only connect your webcam to a USB port of your computer and turn it on before you start the session.

***Note**: Your computer system must be connected to a video capture device, such as a webcam, and the proper software installed, in order to use this function.*

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations for the accurate use of the instrumentation. It also explains several biofeedback training techniques.

Chapter: SEMG BIOFEEDBACK TRAINING

Also recommended:

- INTRODUCTION TO SURFACE ELECTROMYOGRAPHY
- SKELETAL MUSCLE PROPERTIES

GENERAL PROCEDURE

Starting the Session

If you are going use a webcam to make a video recording of this session, connect your webcam to a USB port of your computer and turn it on.

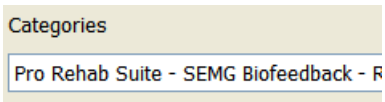
- Connect the sensors to the encoder as follows:
  - **MyoScan/MyoScan-Z sensor** to **channel A**.
  - Optional **MyoScan/MyoScan-Z sensors** to **channel B to D,** and **channels E to J** for FlexComp Infiniti.

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Myo	**Myo** *(optional)*	**Myo** *(optional)*	**Myo** *(optional)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*	**Myo** *(optional for FlexComp)*

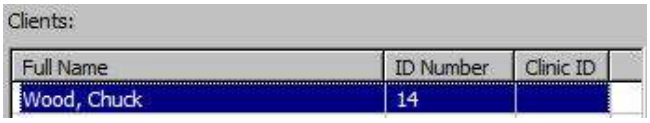
- Turn the encoder on.

1. Click **Quick Start**.

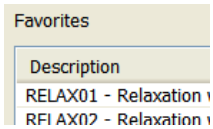
2. From **Categories**, select one of the categories starting with "**Pro/Flex Rehab Suite – SEMG Biofeedback –**".



3. From **Clients**, select a name.



4. From **Favorites**, select the desired SEMG Biofeedback Protocol.
5. Click **OK**.

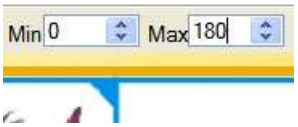


- Click the **Start** button  .

  You can view each screen by clicking on the numerical buttons on the toolbar at the top.

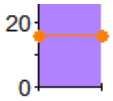
- If the feedback is **scale dependent**, you can adjust the sensitivity of the animation or graph as follow:

Select the animation by clicking on it. A thin red frame will appear around it.



Type the desired EMG scale in **Min** and **Max**. Then click anywhere on the screen.

- If the feedback is **threshold-dependent:** The threshold line on a bar graph, line graph and animation can be adjusted in the same way as the vertical scale. The text box labeled **Thr1** is for single threshold graphs, while **Thr2** is for double threshold graphs like the multi-line graph that can have up to two guidelines.



You can also directly move the threshold by placing the mouse cursor on the threshold line, pressing and holding the mouse left button and moving the cursor up and down.

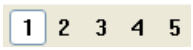
- To stop the session, click the Stop button: 

CATEGORY: PRO/FLEX SUITE – SEMG BIOFEEDBACK – RELAXATION

These screens are designed for muscle deactivation training and, ultimately, total relaxation.

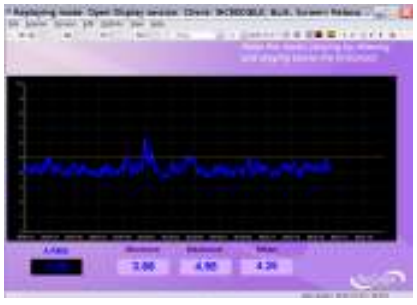
RELAX01 - Relaxation with 1 EMG

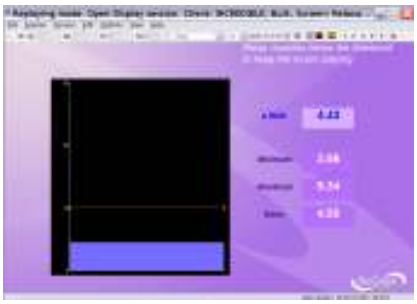
Relaxation - 1Ch Line Graph



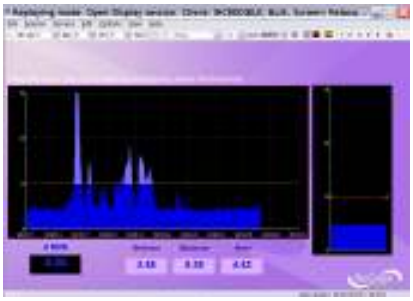
☐ Scale-dependent
☑ Threshold-dependent
☐ Other

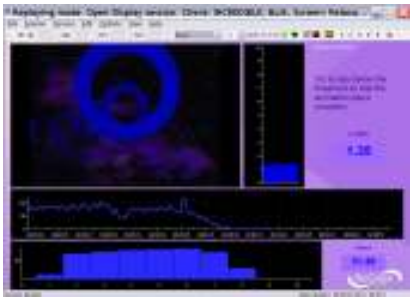
Music is played when the channel A signal stays below the threshold.



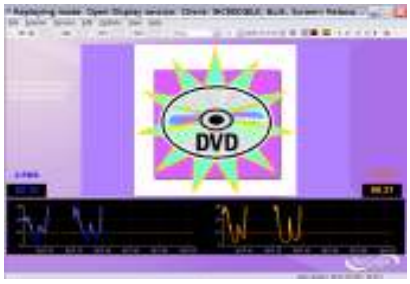
Relaxation - 1Ch Relaxation Bar Graph 1 [2] 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other Music is played when the channel A signal stays below the threshold.	
Relaxation - 1Ch Smiley 1 2 [3] 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The face will smile when the channel A signal is below the threshold.	
Relaxation - 1Ch Knee Flexion 1 2 3 [4] 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other When the signal is below the threshold, the leg relaxes; when above, it straightens.	
Relaxation - 1Ch Wrist Flexion 1 2 3 4 [5] ☐ Scale-dependent ☑ Threshold-dependent ☐ Other When the signal is below the threshold, the wrist relaxes; when above, it straightens.	

RELAX02 - Relaxation with 1 EMG

Relaxation - 1Ch Filled Line-Bar Graphs [1] 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other Music is played when the channel A signal stays below the line graph threshold. The signal is displayed in two different views: filled line graph and bar graph.	

Relaxation - 1 Ch Parrot Puzzle 1 **2** 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other If the EMG reading is below the threshold for 10 seconds then the puzzle starts to fill in. If the signal goes above, pieces will disappear.	
Relaxation - 1Ch Growing Fractal 1 2 **3** 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other This display assists a patient to differentiate between contracting and relaxing their muscles. Set the animation scale to a maximum value that is appropriate for a low sub-maximal contraction. Set the animation threshold in the middle of this scale. As the patient sustains a sub-maximal contraction and the EMG activity goes above the threshold, the fractal will fill in. As the patient releases the contraction and the EMG activity falls below its threshold the fractal will slowly open and a relaxing song is heard. The complete animation cycle takes approximately 20 seconds, 10 on each side of the threshold.	
Relaxation - 1Ch Space Hoops 1 2 3 **4** 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The animation moves when the channel A signal is below the threshold.	
Relaxation - 1Ch DVD 1 2 3 4 **5** ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The channel A signal must stay below the bar graph's threshold to keep the DVD screen size constant.	

RELAX03 - Relaxation with 2 EMG

Relaxation - 2Ch Shrinking Heads 1 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other Music is played when both channels A and B (bar graphs on the right) are below the threshold. The two heads must have the same size, which means both signals must be at the same level. Channel B could be connected to the healthy site, in order to use it as a model for the unhealthy site.	
Relaxation - 2Ch Relaxation with DVD 1 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The DVD will resume playing when both channels A and B are below the threshold.	

CATEGORY: PRO/FLEX SUITE – SEMG BIOFEEDBACK – STRENGTHENING

These screens are designed for muscle activation training and ultimately strengthening. The scale should be adjusted according to the maximal force and the threshold to the training goal.

STRN01 - Strengthening with 1 EMG

The three screens show a classic view of the signal with bar graphs and line graphs.

Strengthening - 1Ch Bar Graph 1 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other This screen graphs the channel A signal on a bar graph and also displays statistics. A sound plays when the signal goes above the threshold.	
Strengthening - 1Ch Filled Line Graph 1 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The signal changes color, and bolero music plays, when channel A goes above the threshold.	

Strengthening - 1Ch Filled Line-Bar Graphs 1 2 **3** 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The signal changes color, and music plays, when channel A goes above the line graph threshold. The bar graph also displays the EMG levels in real time.	

STRN02 – Contract and Hold (with 1 EMG)

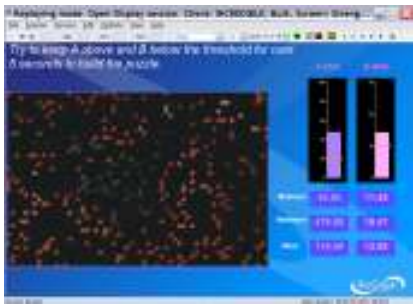
The four next screens provide the patient with more interesting feedback. Each screen requires the patient to hold the contraction for a longer period of time.

Strengthening - 1Ch Smiley **1** 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The face will continue smiling as long as the contraction on channel A is being held above threshold.	
Strengthening - 1Ch Rooster Puzzle 1 **2** 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The puzzle will fill when the contraction on channel A has been held above the threshold for more than 3 seconds. If the contraction dips below the threshold, then the timer will reset. The threshold is also indicated by the Tarantella tune and can be set on the bar graph instrument.	
Strengthening - 1Ch Flower Puzzle 1 2 **3** 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The puzzle will fill when the contraction on channel A has been held above the threshold for more than 5 seconds. If the contraction dips below the threshold, then the timer will reset. The threshold is also indicated by a jazz tune and set on the bar graph.	

Strengthening - 1Ch Dolphin Puzzle 1 2 3 **4** 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The puzzle will fill when the contraction on channel A has been held above the threshold for more than 10 seconds. If the contraction dips below the threshold, then the timer will reset. The threshold is also indicated by a harpsichord sound and can be set on the bar graph instrument.	

STRN03 – Uptrain A / Downtrain B (with 2 EMG)

The four next screens are more challenging, involving two muscles. Channel A is used for the muscle that must be activated, while channel B is used for the muscle that must not be activated.

Strengthening - 2Ch Tomato Puzzle **1** 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The signal displayed on channel A must exceed the threshold and channel B must be below the threshold for 5 seconds in order for the puzzle to be revealed. Basic statistics are also displayed to give a more detailed picture.	
Strengthening - 2Ch Hero Morph-Slow 1 **2** 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The animation is controlled by both channels A and B, and is threshold dependent. The signal A goes above its threshold, and the signal B stays below its threshold, the boy slowly morphs into a superman. The complete animation cycle is about 14 seconds. An audio tone is heard when the signal A is above the threshold. If one of the conditions is not satisfied, the animation resets to the beginning. The animation can also be reset manually.	
Strengthening - 2Ch Car Race 1 2 **3** 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The aim is to make the blue car (channel A) pass the finish line (the white bar on the far right of each track) before the yellow car (channel B). To meet this goal, A must stay above its threshold while B stays below. The points for A increment when both channels are in condition, and the points for B increment when B is above threshold.	

Strengthening - 2Ch Conditional DVD 1 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The DVD stays on when the channel A signal is above its threshold and channel B signal stays below. If either condition is not met the DVD stops playing.	

STRN04 – Uptrain A / Downtrain B Specific (with 2 EMG)

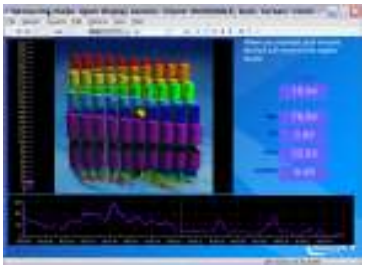
The two next screens are specific to a given joint.

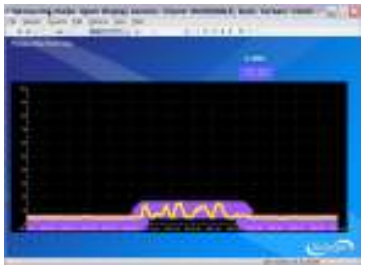
Strengthening - 2Ch Knee Flexion 1 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other Control over both channels during the movement is required to move the animation. The threshold can be set on the bar graphs to make it progressively easier or harder to trigger the animation.	
Strengthening - 2Ch Wrist Flexion 1 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other Control over both channels during the movement is required to move the animation. The threshold can be set on the bar graphs to make it progressively easier or harder to trigger the animation.	

CATEGORY: PRO/FLEX SUITE – SEMG BIOFEEDBACK – CONTROL

These screens are designed for muscle control training. The scale should be adjusted according to the maximal force. Channel B is used to train the patient not to activate a second muscle while activating the first one. The threshold of channel B should be set at a small value above the resting baseline.

CTRL01 - Control with 1 EMG

Control - 1Ch Tubes 1 2 3 4 5 ☑ Scale-dependent ☐ Threshold-dependent ☐ Other The animation represents channel A and is dependent on the scale on the left. The ball climbs the tubes when the signal goes up. Instruct your patient to move the ball to a given tube color.	

Control - 1Ch Tension Discrimination Training Level 1 1 [2] 3 4 5 ***Control - 1Ch Tension Discrimination Training Level 2*** 1 2 [3] 4 5 ***Control - 1Ch Tension Discrimination Training Level 3*** 1 2 3 [4] 5 ☑ Scale-dependent ☐ Threshold-dependent ☐ Other Each screen contains a template to follow. Three levels of difficulty are available. You can also adjust the level of difficulty by adjusting the graph scale. These screens are designed for tension discrimination training and for muscle contraction control.	

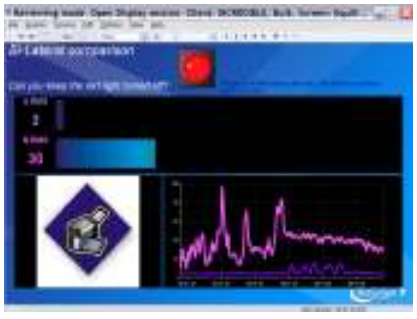
CTRL02 - Control with 2 EMG

Control - 2Ch Hero Morph-Fast [1] 2 3 4 5 ☑ Scale-dependent ☐ Threshold-dependent ☐ Other The animation represents channel A and is dependent on the scale on the left. The boy morphs into a superman when the channel A signal is toward the upper range of the scale. As the signal comes down the scale, the superman returns to a boy.	
Control - 2Ch Animal Game 1 [2] 3 4 5 ☑ Scale-dependent ☐ Threshold-dependent ☐ Other An exercise to control muscle contraction by lining up the cartoon man with the animal in the blue square while the line-up of animals constantly changes. Channel A is connected to the animation. The stronger the contraction, the further the man moves to the right. To keep the man moving, the signal from channel B should remain below its threshold.	

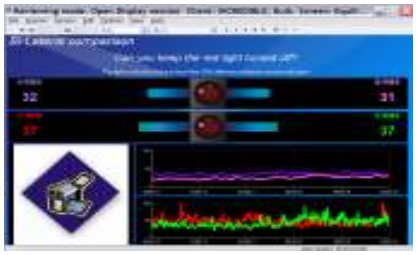
CATEGORY: PRO/FLEX SUITE – SEMG BIOFEEDBACK – EQUILIBRATION

These screens are designed for equilibration training. Equilibration refers to bringing muscles into equilibrium.

EQUL01 - Equilibration with 2 EMG

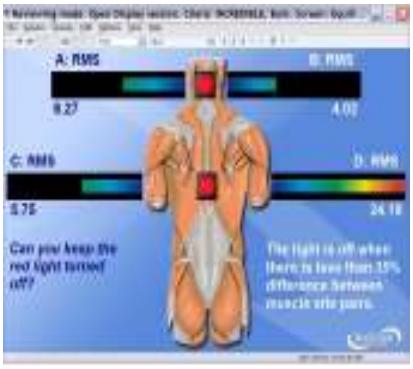
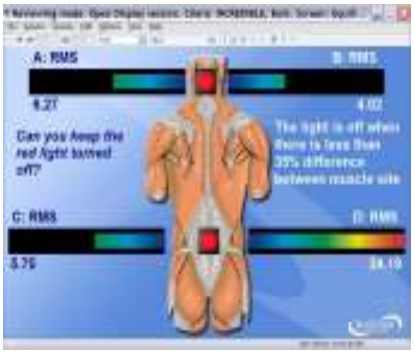
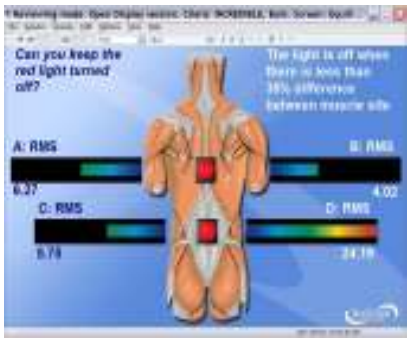
Equilibration - 2Ch Balance Ratio 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other This two-channel ratio screen easily communicates the interplay of two muscles. When the muscles are in equilibrium, the weight is in the middle of the balance. When the weight is off to one end or the other, the muscles are progressively more out of balance. The bar graphs are connected to channels A, B.	
Equilibration - 2Ch Gorilla Ratio 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other This two-channel ratio screen easily communicates the interplay of two muscles. When the muscles are in equilibrium, the ball is balanced on the gorilla's shoulders. When the ball is off to one end or the other, the muscles are progressively more out of balance. The bar graphs are connected to channels A, B.	
Equilibration - 2Ch Bi-Lateral Bar-Video 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The light turns red when the difference is greater than 35%. Both signals are also displayed in the same line graph and mirrored bars for comparison.	
Equilibration - 2Ch Bi-Lateral Bar-Video 2 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The light turns red when the difference is greater than 35%. Both signals are also displayed in the same line graph and bars for comparison.	

EQUL02 - Equilibration with 4 EMG

Equilibration - 4Ch Balance Ratio 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other This four-channel ratio screen easily communicates the interplay of four muscles. When the muscles are in equilibrium, the weight is in the middle of the balance. When the weight is off to one end or the other, the muscles are progressively more out of balance. The bar graphs will be connected to channels A, B, C, D.	
Equilibration - 4Ch Gorilla Ratio 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other This four-channel ratio screen easily communicates the interplay of four muscles. When the muscles are in equilibrium, the ball is balanced on the gorilla's shoulders. When the ball is off to one end or the other, the muscles are progressively more out of balance. The bar graphs will be connected to channels A, B, C, D.	
Equilibration - 4Ch Bi-Lateral Bar-Video 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The light turns red when the difference is greater than 35%. Both signals are also displayed in the same line graph and mirrored bars for comparison.	
Equilibration - 4Ch Bi-Lateral Bar-Video 2 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The light turns red when the difference is greater than 35%. Both signals are also displayed in the same line graph and bars for comparison.	

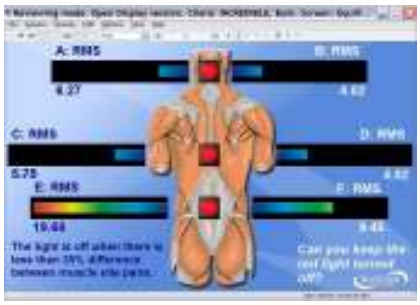
EQUL03 – Postural Training with 4 EMG

The next three screens are specified for postural training. They will reinforce good posture with visual assistance.

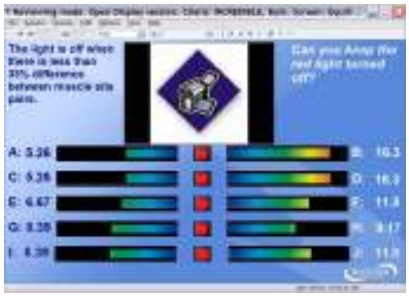
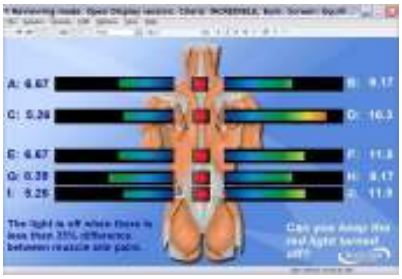
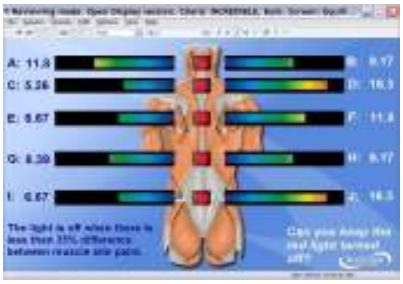
Equilibration – 4Ch Postural Training – Cervical & Thoracic Spine **1** 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The light will turn red when the difference between the two muscles at the site is greater than 35%. The mirrored bar graphs assist the comparison at the site.	
Equilibration – 4Ch Postural Training – Cervical & Lumbar Spine 1 **2** 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The light will turn red when the difference between the two muscles at the site is greater than 35%. The mirrored bar graphs assist the comparison at the site.	
Equilibration – 4Ch Postural Training – Thoracic & Lumbar Spine 1 2 **3** 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The light turns red when the difference is greater than 35%. Both signals are also displayed in the same line graph and bars for comparison.	

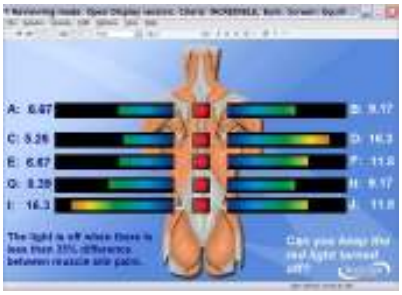
EQUL04 – Postural Training with 6 EMG (FlexComp Infiniti only)

Equilibration – 6Ch Bi-Lateral – Video **1** 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other Comparing 6 muscle sites, the difference between each two-muscle site should be less than 35%. The red light will be on to indicate the difference is greater than 35%.	

Equilibration – 6Ch Postural Training – Cervical & Thoracic & Lumbar Spine 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The 6 muscle sites are as indicated (Cervical, thoracic, and lumbar). The difference between each pair of muscles at the site should be less than 35%. The red light will be on to indicate that the difference is greater than 35%.	

EQUL05 – Postural Training with 10 EMG (FlexComp Infiniti only)

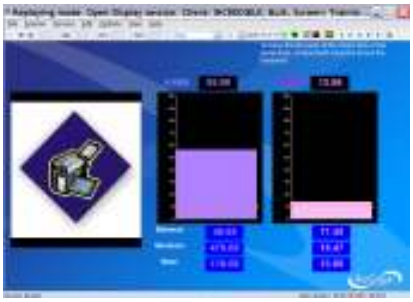
Equilibration – 10Ch Bi-Lateral - Video 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other Comparing 10 muscle sites, the difference between each two-muscle site should be less than 35%. The red light will be on to indicate the difference is greater than 35%.	
Equilibration – 10Ch Postural Training – Cervical & Thoracic & Lumbar Spine 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The 10 muscle sites are as indicated (Cerivcal, thoracic, and lumbar). The difference between each pair of muscles at the site should be less than 35%. The red light will be on to indicate that the difference is greater than 35%.	
Equilibration – 10Ch Postural Training – Cervical & Thoracic & Lumbar Spine 2 1 2 3 4 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The 10 muscle sites are as indicated (Cerivcal, thoracic, and lumbar). The difference between each pair of muscles at the site should be less than 35%. The red light will be on to indicate that the difference is greater than 35%.	

Equilibration – 10Ch Postural Training –Thoracic & Lumbar Spine 1 2 3 **4** 5 ☐ Scale-dependent ☐ Threshold-dependent ☑ Other The 10 muscle sites are as indicated (Thoracic, and lumbar). The difference between each pair of muscles at the site should be less than 35%. The red light will be on to indicate that the difference is greater than 35%.	

CATEGORY: PRO/FLEX SUITE – SEMG BIOFEEDBACK – TRAINING

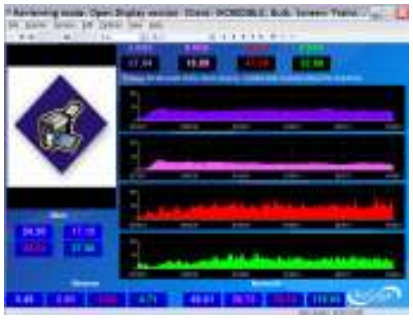
These screens are for general training, involving more complex or various exercises.

TRNG01 - Training with 2 EMG

Training - 2Ch Line Graph – Grow Box **1** 2 3 4 5 ☑ Scale-dependent ☑ Threshold-dependent ☐ Other A proportional sound is played when the square expands past the limit (red line). The left square is for channel A and the right square for channel B. The signals are also displayed on a line graph.	
Training - 2Ch Bar Graphs 1 **2** 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other A simple and easy-to-understand display for two channels of EMG. A song is played in two parts. If both channels are below the threshold then the music stops. If one or both channels are above the threshold then progressively more layers of music are added.	
Training - 2Ch Filled Line Graphs 1 2 **3** 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other Two filled line graphs display the two channels, with a color change at the threshold. Each channel controls a different part of the same song.	

Training - 2Ch Line-Bar Graphs 1 2 3 **4** 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other Both channels are displayed on a line graph and a bar graph.	
Training – 1Ch Motor Copy Training 1 2 3 4 **5** ☐ Scale-dependent ☐ Threshold-dependent ☑ Other This screen is used for the motor copy training technique. It can also be used to train the patient to consistently repeat the same contraction without a template. Do the first repetition, and then wait for the new signal to appear in the top graph below before doing the next repetition. The movement detection threshold is set to 20µV. If you want to modify this value, from the **Edit** menu select **Edit VC Settings**, select V210 and edit the **Input 2 Constant Value**.	

TRNG02 - Training with 4 EMG

Training - 4Ch Bar Graphs **1** 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other Four bar-graphs representing 4 EMG channels, with a color change above threshold.	
Training - 4Ch Filled Line Graphs 1 **2** 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other Four filled line graphs display the four channels, with a color change at the threshold.	

Training - 4Ch Line-Bar Graphs 1 2 3 4 5 ☐ Scale-dependent ☑ Threshold-dependent ☐ Other The four channels are displayed on a line graph and a bar graph.	

UNSTABLE SHOULDER

MOTOR FUNCTION RESTORATION

Respiration Training

OVERVIEW

Respiration training should be considered as part of the rehabilitation program:

- Proper breathing during effort enhances the efficiency of the contraction and therefore the efficiency of the training.
- Proper breathing is necessary for overall health and speeds up healing.
- Respiration training may also help the examinee to relax before therapy (reduces anxiety).

The following biofeedback training screens were designed for this purpose.

This logo on a screen in a protocol indicates that you can use an optional webcam with the screen to record video of the session. You need only connect your webcam to a USB port of your computer and turn it on before you start the session.

***Note**: Your computer system must be connected to a video capture device, such as a webcam, and the proper software installed, in order to use this function.*

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations.

Chapter: RESPIRATION TRAINING WITH BIOFEEDBACK

PROCEDURE

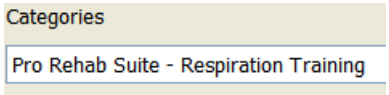
- Connect the sensors to the encoder as follows:
  - **Respiration sensor** to **channel D**.
  - **MyoScan/MyoScan-Z** to **channel A** and **B** (optional).

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Myo *(optional)*	**Myo** *(optional)*		**Resp**						

- Turn the encoder on.

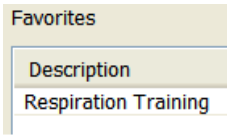
1. Click **Quick Start**.

2. From **Categories**, select **Pro/Flex Rehab Suite – Respiration Training**



3. From **Clients**, select a name.

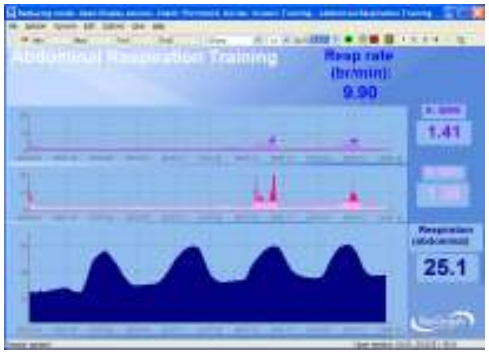
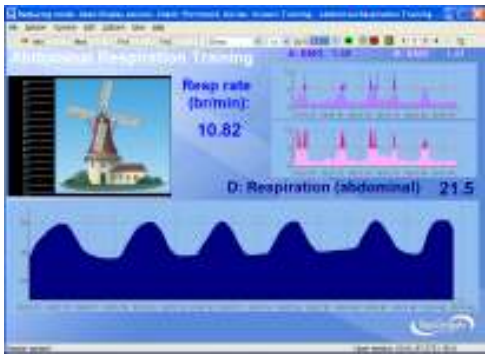
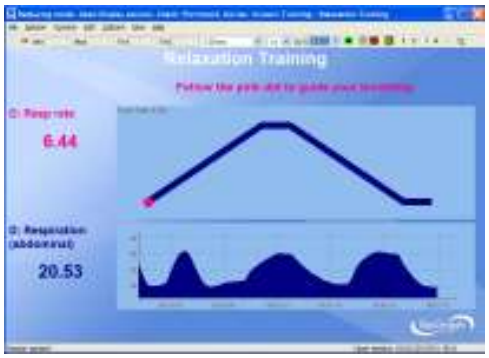
4. From **Favorites**, select the training protocol.
5. Click **OK**.



- Click the **Start** button  .

  You can view each screen by clicking on the numerical buttons on the toolbar at the top.

- To stop the session, click the Stop button: 

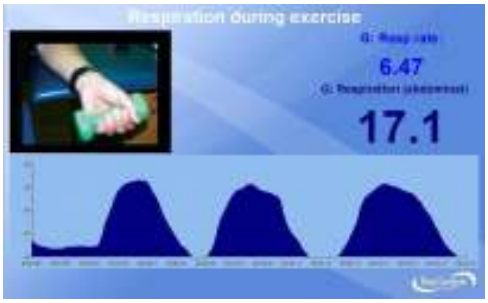
Training - Abdominal Respiration Training 1 2 3 4 5 This screen was designed to train abdominal breathing. The line graph at the bottom displays the respiration amplitude. The two line graphs on the right display the EMG of the associated muscles. If the EMG of one channel is above its threshold, music will be heard.	
Training - Abdominal Respiration Training Windmill 1 2 3 4 5 This screen was designed to train abdominal breathing. The greater is the abdominal respiration amplitude, the faster the windmill turns. The line graph at the bottom displays the respiration amplitude. The two line graphs on the right display the EMG of the associated muscles. If the EMG of one channel is above its threshold, the windmill will stop turning and music will be heard.	
Training - Relaxation Training 1 2 3 4 5 This screen was designed for relaxation. The line graph displays the respiration amplitude. The examinee must follow the pink dot. This will lead them to a slow breathing rate (around 6 breath/min).	

Training – Respiration During Exercise

1 2 3 4 5

The screen was designed to help the examinee to breath properly during an exercise. It has a line graph displaying the respiration amplitude and a video camera.

A tone proportional to the respiration amplitude can be heard.



Review screen: Report Review – Respiration and EMG Review Screen

The screen was designed for the review of the session.

It shows the respiration amplitude and the EMG activity along with the video.

All these screens are accessible from **Start Open Display Session** in the channel set "**Respiration Training**".

Heart Rate Monitoring and HRV

OVERVIEW

The system allows the therapist to monitor rapid changes in the heart rate. It gives the choice of gathering the heart rate from **EKG (electrocardiogram)** or **BVP (Blood Volume Pulse).**

The following screens allow the monitoring of heart rate (from BVP or EKG), respiration and EMG (2 sites).

This logo on a screen in a protocol indicates that you can use an optional webcam with the screen to record video of the session. You need only connect your webcam to a USB port of your computer and turn it on before you start the session.

***Note**: Your computer system must be connected to a video capture device, such as a webcam, and the proper software installed, in order to use this function.*

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations.

Chapter: HEART RATE MONITORING & HRV

Also recommended:

- INTRODUCTION TO SURFACE ELECTROMYOGRAPHY
- RESPIRATION TRAINING WITH BIOFEEDBACK

PROCEDURE

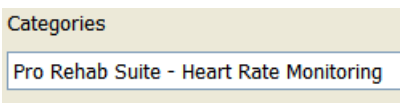
- Connect the sensors to the encoder as follows:
  - **BVP** or **EKG sensor** to **channel C**.
  - **Respiration sensor** to **channel D**.
  - **MyoScan/MyoScan-Z** to **channel A** and **B** (optional).

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Myo *(optional)*	**Myo** *(optional)*	**EKG** *or* **BVP**	**Resp**						

- Turn the encoder on.

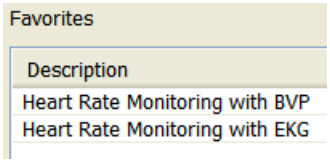
1. Click **Quick Start**.

2. From **Categories**, select **Pro/Flex Rehab Suite – Heart Rate Monitoring**



3. From **Clients**, select a name.

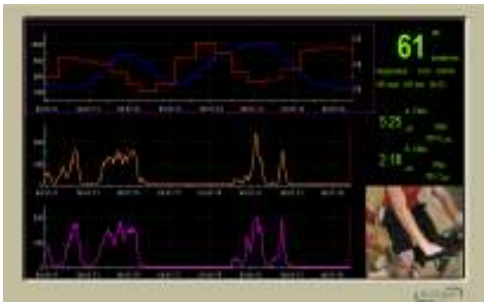
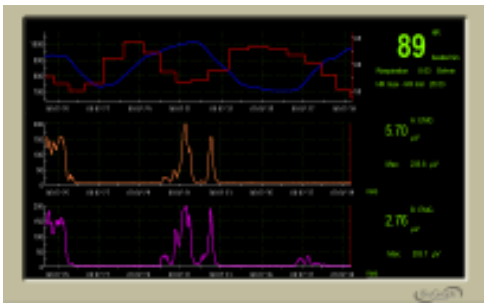
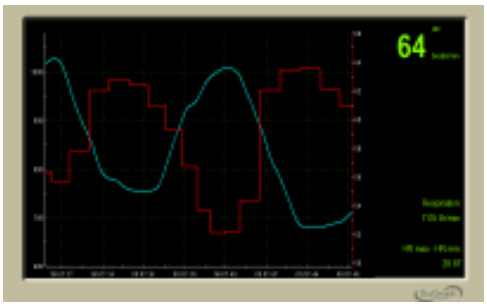
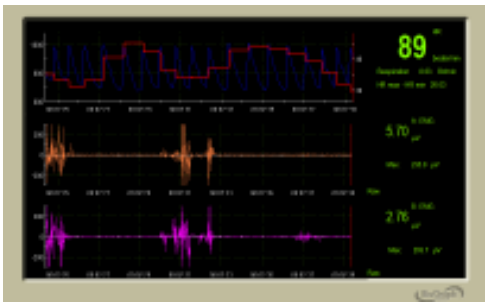
4. From **Favorites**, select the training protocol (with EKG or BVP).
5. Click **OK**.



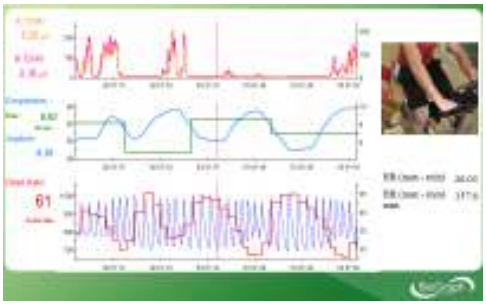
- Click the **Start** button  .

  You can view each screen by clicking on the numerical buttons on the toolbar at the top.

- To stop the session, click the Stop button: 

Heart Rate & EMG Monitoring with webcam 1 2 3 4 5 This screen displays the respiration amplitude and the heart rate on the same line graph. It plots the 2 channels of EMG. The HRV measure HR Max - HR Min is also displayed. Video can be recorded.	
Heart Rate & EMG Monitoring 1 2 3 4 5 This screen is similar to the one above, but without webcam.	
Heart Rate & Monitoring 1 2 3 4 5 This screen is similar to the ones above, but shows only the heart rate and respiration.	
Verification Screen 1 2 3 4 5 This is a signal verification screen. It shows raw BVP (or EKG) with heart rate, as well as raw EMG.	

Review screen

The screen was designed for the review of the session. It shows the respiration amplitude and rate, the raw BVP (or EKG), heart rate, and Heart Rate Variability (HRV), and the EMG activity along with the video.	

All these screens are accessible from **Start Open Display Session** in the channel set "**Heart Rate Monitoring with BVP and EMG**" or "**Heart Rate Monitoring with EKG and EMG**".

Skin Conductance and Temperature Biofeedback

OVERVIEW

Skin conductance and peripheral temperature biofeedback is useful when training of overall physiology is desired, as it incorporates two modalities with simple correlations to relaxation: skin conductance (lower) and temperature (raise). When these physiological measures meet the biofeedback conditions, the subject is in a general state of relaxation. These physiological measures can also be used to assess the level of stress of the examinee during the examination.

The following biofeedback screens were designed for that purpose.

This logo on a screen in a protocol indicates that you can use an optional webcam with the screen to record video of the session. You need only connect your webcam to a USB port of your computer and turn it on before you start the session.

***Note**: Your computer system must be connected to a video capture device, such as a webcam, and the proper software installed, in order to use this function.*

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations.

Chapter: SKIN CONDUCTANCE AND PERIPHERAL TEMPERATURE BIOFEEDBACK

Also recommended:

- RESPIRATION TRAINING WITH BIOFEEDBACK
- HEART RATE MONITORING & HRV

PROCEDURE

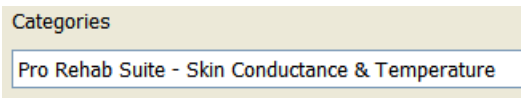
- Connect the sensors to the encoder as follows:
  - **Temperature sensor** to **channel C**.
  - **Skin Conductance sensor** to **channel E**.

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
		Temp		**SC**					

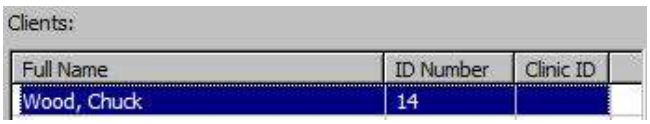
- Turn the encoder on.

1. Click **Quick Start**.

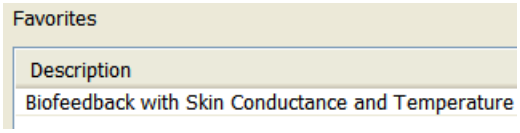
2. From **Categories**, select **Pro/Flex Rehab Suite – Skin Conductance and Temperature**



3. From **Clients**, select a name.



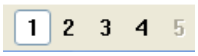
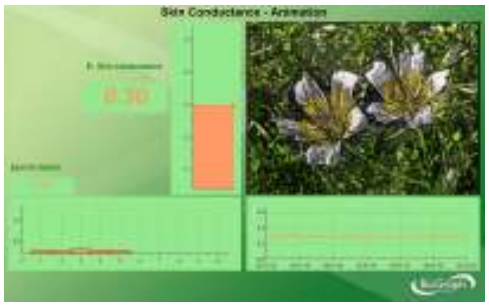
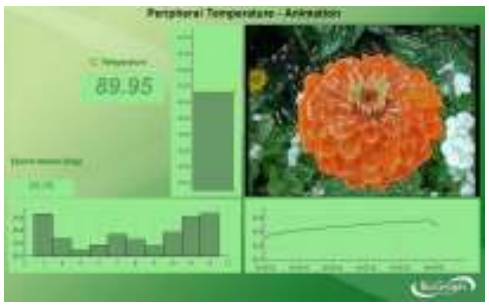
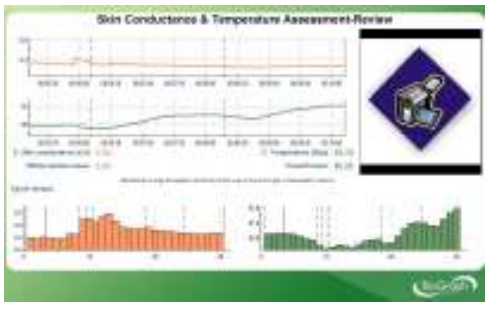
4. From **Favorites**, select **Biofeedback with Skin Conductance and Temperature**.
5. Click **OK**.



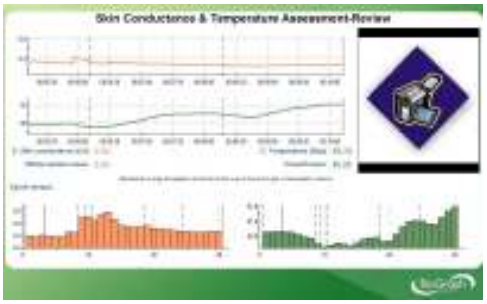
- Click the **Start** button  .

  You can view each screen by clicking on the numerical buttons on the toolbar at the top.

- To stop the session, click the Stop button: 

Training - Biofeedback on Skin Conductance  The screen shows a bar graph of the skin conductance and plays a song and an animation when the SC value dips below the threshold. The threshold is set to automatically follow the signal to allow for instantaneous feedback of any change of direction.	
Training - Biofeedback on Temperature  The screen shows a bar graph of the temperature signal and plays a song and an animation when the signal value moves over the threshold. The threshold is set to automatically follow the signal to allow for instantaneous feedback of any change of direction.	
Assessment & Review – Skin Conductance & Temperature  The screen was designed for assessment. The screen shows a line graph of the raw signals of SC and Temp and a trend graph of epoch means. It also has a video/audio instrument, so you can record the examination. Events can be marked by hitting the space bar or a key of the keyboard that you would have preliminarily labeled with the name of the event).	

Review/replay screen

The screen was designed for the review of the session. The screen shows a line graph of the raw signals of SC and Temp and a trend graph of epoch means. Drag the time marker (vertical red line) over the raw signal and see the value for any data point as a number in the center of the screen. To see the whole session mean, drag the time marker completely to the end of the session.	

All these screens are accessible from **Start Open Display Session** in the channel set "**Biofeedback with Skin Conductance and Temperature**".

Static Range of Motion Assessment

OVERVIEW

Range of Motion (ROM) assessment evaluates the ability of the examinee to achieve the full range of movement for a given part of the body.

A dual inclinometer is used for measuring the angle between the neutral position and the maximum range of motion position that the examinee can achieve until they feel restriction, tightness or discomfort.

The protocols are based on AMA guides (6th edition, 2007).

Protocols use the world standard Neutral Zero Reference method. This method defines the 0° angle as referring to the neutral position of the joint.

The measurement is repeated 6 times as a validity check.

The measures are compared to AMA normative data.

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations for the accurate use of the instrumentation. It also explains how to prepare the examinee and the procedure to follow.

Chapter: RANGE OF MOTION ASSESSMENT; **section:** STATIC RANGE OF MOTION ASSESSMENT

GENERAL PROCEDURE

Preparing the instrumentation

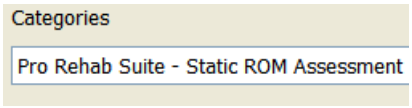
- Connect the sensors to the encoder as follows:
  - **Dual/single inclinometer** to **channel E**;
  - **Foot pedal** to **channel C**.

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
		Pedal		**INC**					

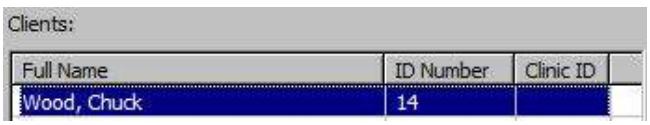
- Turn the encoder on.

1. Click **Quick Start**.

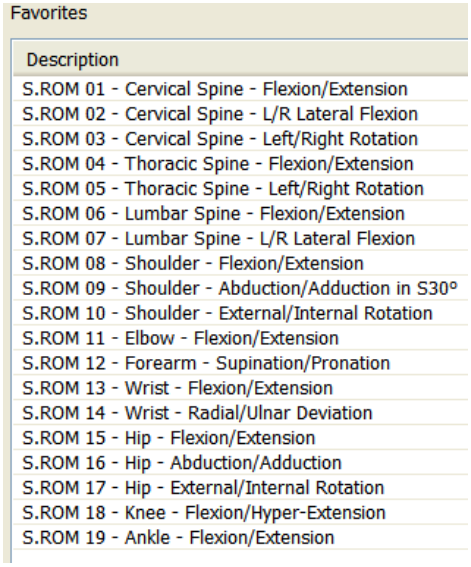
2. From **Categories**, select **Pro/Flex Static ROM Assessment**.



3. From **Clients**, select a name.



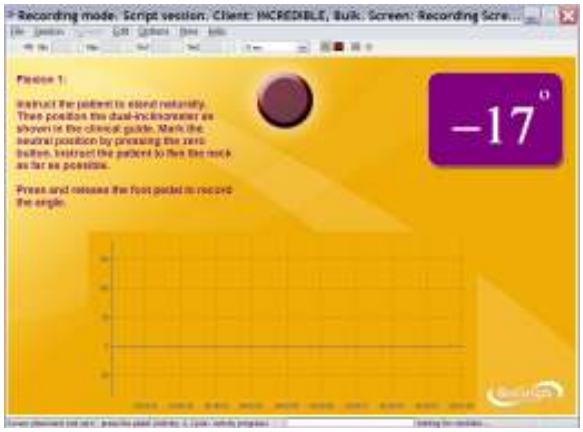
4. From **Favorites**, select the desired Static ROM Protocol.
5. Click **OK**.



- Click the **Start** button  and read the instructions on the screen. **Do not press the foot pedal yet.**

- Position yourself next to the examinee, with the encoder attached to your belt and the pedal near your foot.
- Press the foot pedal to go to the next screen.
- Position and stabilize the examinee in neutral position.
- If the patient cannot reach the neutral position, right-click on the purple box on the screen, enter the neutral zero reference (angle displayed when zero button is pressed) and click **Apply**:

- Position the dual inclinometer on the examinee and press the Zero button (on the primary or secondary, whichever is more convenient for you).

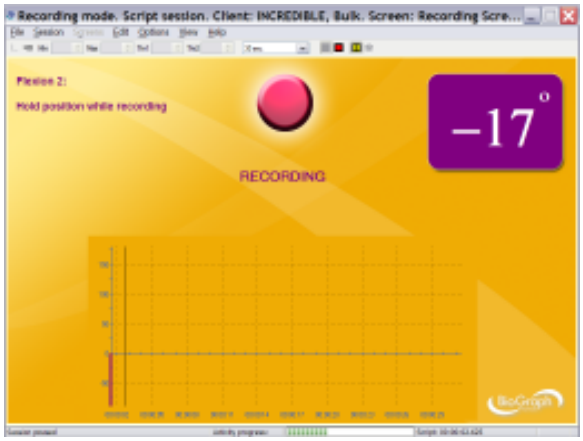


Measuring

1. Instruct the examinee to perform the motion slowly, until they feel restriction, tightness or discomfort.

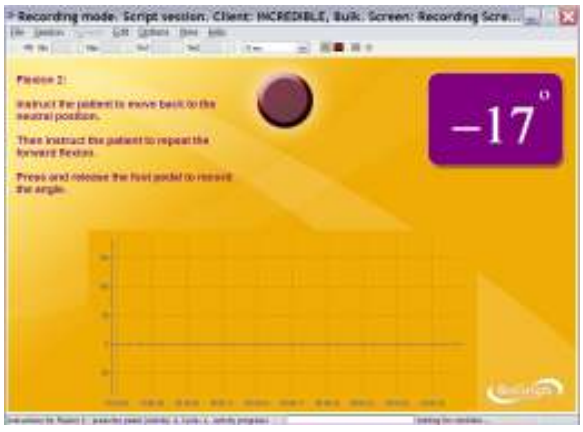
   Make sure the inclinometer does not move against the body part during the motion.

2. When the position is stabilized, press the pedal to record the measure.



3. Instruct the examinee to go back to neutral position. **Do not press the Zero button again**.

- Repeat the exercise **6 times**.
- Then repeat it another **6 times** for the antagonistic movement.



- When the session ends, a series of message prompts guides you through the process of saving data, adding notes to the session file, and switching to reviewing mode so that you can generate a session report.

Generating a report

Dynamic Range of Motion Assessment

OVERVIEW

Similarly to Dynamic SEMG, Dynamic ROM assesses muscle tension through various movements, by combining EMG with inclinometry.

In addition to general protocols, the system provides three assessment protocols for the **cervical spine** (CP, SCM or Traps) and two for the **lumbar spine**.

It also provides one assessment protocol for the **anterior knee** (VMO and VL).

This logo on a screen in a protocol indicates that you can use an optional webcam with the screen to record video of the session. You need only connect your webcam to a USB port of your computer and turn it on before you start the session.

***Note**: Your computer system must be connected to a video capture device, such as a webcam, and the proper software installed, in order to use this function.*

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations for the accurate use of the instrumentation. It also explains how to prepare the examinee and the procedure to follow.

Chapter: RANGE OF MOTION ASSESSMENT; **section:** DYNAMIC RANGE OF MOTION ASSESSMENT

Also recommended:

- INTRODUCTION TO SURFACE ELECTROMYOGRAPHY
- SKELETAL MUSCLE PROPERTIES
- SEMG ASSESSMENT; **section:** DYNAMIC SEMG ASSESSMENT

GENERAL PROCEDURE

Starting the Session

If you are going use a webcam to make a video recording of this session, connect your webcam to a USB port of your computer and turn it on.

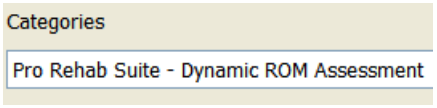
- Connect the sensors to the encoder as follows:
  - **MyoScan/MyoScan-Z sensors** to **channels A and B** (left in A, right in B).
  - Optional **MyoScan/MyoScan-Z sensors** to **channels C and D** (left in C, right in D).
  - **Dual/single inclinometer** to **channel E**.

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Myo	**Myo**	**Myo** *(optional)*	**Myo** *(optional)*	**INC**					

- Turn the encoder on.

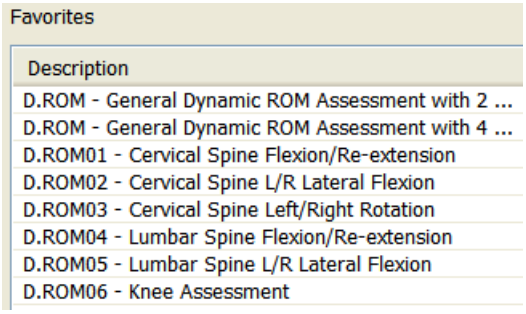
1. Click **Quick Start**.

2. From **Categories**, select **Pro/Flex Rehab Suite - Dynamic ROM Assessment**.



3. From **Clients**, select a name.

4. From **Favorites**, select the desired General Dynamic ROM Assessment Protocol.
5. Click **OK**.



Measuring

- Click the **Start** button  .

Press the zero button of the inclinometer once, to mark the neutral position.

Mark the different stages of the movement with event makers (events can be marked by hitting the space bar or a keyboard key that was previously assigned the name of the event).

Reviewing the session

When the session ends, a series of message prompts guides you through the process of saving data, adding notes to the session file, and switching to reviewing mode so that you can generate a session report.

PROCEDURE FOR LUMBAR SPINE ASSESSMENT

PROCEDURE FOR CERVICAL SPINE ASSESSMENT

PROCEDURE FOR ANTERIOR KNEE ASSESSMENT

Range of Motion Training

OVERVIEW

Range-of-motion therapy usually consists of simple exercises to increase the range of motion, flexibility, strength, endurance and control over the movement.

The following biofeedback training screens were designed for this purpose.

This logo on a screen in a protocol indicates that you can use an optional webcam with the screen to record video of the session. You need only connect your webcam to a USB port of your computer and turn it on before you start the session.

***Note**: Your computer system must be connected to a video capture device, such as a webcam, and the proper software installed, in order to use this function.*

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations for the use of biofeedback for ROM therapy. It also explains how to prepare the examinee and the procedure to follow.

Chapter: ROM THERAPY WITH BIOFEEDBACK

PROCEDURE

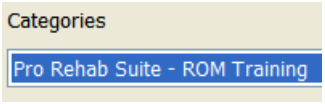
- Connect the sensors to the encoder as follows:
  - A **single inclinometer unit (InclinoTrac)** to **channel C**.
  - Optionally, the second InclinoTrac unit can be used as a **single inclinometer** and connected to **channel E**.

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
		INC		**INC** *optional*					

- Turn the encoder on.

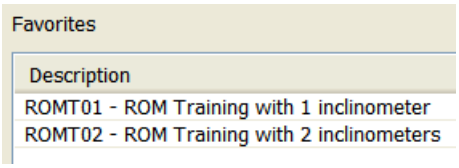
1. Click **Quick Start**.

2. From **Categories**, select **Pro/Flex Rehab Suite – ROM Training**



3. From **Clients**, select a name.

4. From **Favorites**, select the desired training protocol.
5. Click **OK**.



- Click the **Start** button  .

  You can view each screen by clicking on the numerical buttons on the toolbar at the top.

- To stop the session, click the Stop button: 

ROMT01 – ROM Training with 1 inclinometer

Neutral Position Training – Gorilla Animation 1 2 3 4 5 In this screen, the examinee is being trained to keep his joint in neutral position, by keeping the ball centered behind the monkey's neck. When he is successful, the green light turns on.	
Threshold-based Training – Bowling Animation 1 2 3 4 5 This is a threshold-based exercise. The examinee must perform the motion until a threshold is crossed. When this happens, the animation starts, and the bowl is thrown. The examinee must hold the position during 5 seconds to do a strike and get a point. They must then go back to neutral position to restart.	
Neutral Position and ROM Training – Dial Animation 1 2 3 4 5 This is a stretching exercise. The examinee is told to reach a given color on the rainbow. When they return to neutral position, the light turns on.	

ROM Training – Tube Game 1 2 3 **4** 5 This screen is similar to the Dial Animation. This time, the examinee has to move the ball up and down.	
ROM Training – Animal Game 1 2 3 4 **5** Here, the examinee has to align the character with the animal appearing in the left box, by moving his limb.	

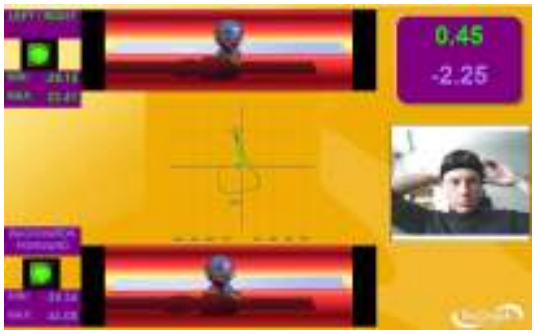
Review screen: ROM Training - Review

The screen was designed for reviewing the session. It shows the ROM amplitude along with the video.	

All these screens are accessible from **Start Open Display Session** in the channel set "**ROM Training with 1 inclinometer**".

ROMT02 – ROM Training with 2 inclinometers

The second unit of the dual-InclinoTrac can also be used as a single unit. You can use both units together, either for working on the three dimensions or bilateral training.

ROM Training – Balance Animation **1** 2 3 4 5 For this screen, the inclinometers are positioned at the back and the left of the head or the trunk. The examinee can train to keep his head/trunk straight (line in the center of the lissajous graph, the balls in the middle of the balance and the green lights turned on). He can also roll his head around his neck and see where his ROM is limited.	

ROM Training – Motor Copy 1 2 3 4 5 Here the inclinometers are attached to the arms or legs. The examinee has to elevate both limbs in the same time to keep the ball centered on the balance. The line on the rainbow gives the averaged angle between the two sides.	
ROM Training - Review 1 2 3 4 5 The screen was designed for reviewing the session but can be used to monitor the motion. It shows the ROM amplitudes along with the video.	

Review Screen: ROM Training - Review

The screen was designed for reviewing the session. It shows the ROM amplitudes along with the video.	

All these screens are accessible from **Start Open Display Session** in the channel set "**ROM Training with 2 inclinometers**".

Manual Muscle Testing

OVERVIEW

Manual muscle testing is the assessment of muscles and tendons and their ability to generate force. Computerized manual muscle testing improves and enriches a method that has existed and evolved for almost a century, by replacing subjective factors with objective data. SEMG allows the monitoring of potential muscle substitution.

Note that muscle testing with ForceTrac is allowed only for grades 4 and 5.

The examinee should be monitored closely and tests should be terminated immediately if there is any evidence of pain.

The system is intended only to capture an objective record of force applied during testing, rather than to reduce the risk of injury. **Therefore the ultimate responsibility for risk of injury rests with the examiner**.

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations for the accurate use of computerized instruments along with traditional muscle testing. It also explains how to prepare the examinee and the procedure to follow.

Chapter: MANUAL MUSCLE TESTING

Also recommended: INTRODUCTION TO SURFACE ELECTROMYOGRAPHY

PROCEDURE

Starting the Session

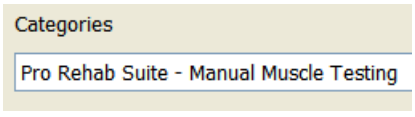
- Connect the sensors to the encoder as follows:
  - **ForceTrac** to **channel D**;
  - **Foot pedal** to **channel C**.
  - **MyoScan/MyoScan-Z** to **channel A** and **B** (optional).

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
Myo *(optional)*	**Myo** *(Optional)*	**Pedal**	**FTrac**						

- Turn the encoder on.

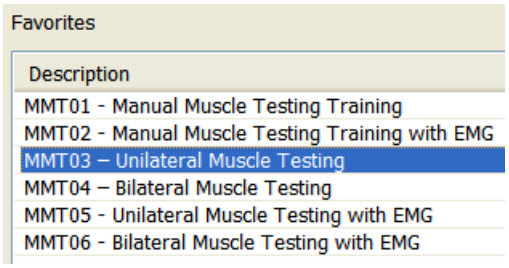
1. Click **Quick Start**.

2. From **Categories**, select **Pro/Flex Rehab Suite - Manual Muscle Testing**.



3. From **Clients**, select a name.

4. From **Favorites**, select the desired Muscle Testing Protocol.
5. Click **OK**.



Muscle Testing Training (MMT01 & MMT02)

These screens were designed for training purposes and for becoming familiar with the procedure and the instrumentation. They allow the recording of video, so the session can be replayed.

- If you use EMG sensors (MMT02), position them on the muscles of interest.

Note: *Make sure your ForceTrac is properly calibrated before starting.*

- Click the **Start** button  .
- Ask the examinee to complete the range of motion and stabilize their position.
- Position the ForceTrac on the examinee.
- When ready, press the pedal and perform the test at full load.
- Resistance should always be applied gradually (not suddenly) and in the direction of the motion ("line of pull" of the muscle). The break usually happens within 2 or 3 seconds. A shorter break time may lead to re-injury. A longer break time may lead to fatigue.
- The trace of the applied force should appear after few seconds.
- You can repeat the exercise.

Training Screen without SEMG

Training Screen with SEMG

Unilateral/Bilateral Muscle Testing (MMT03 & MMT04)

Note: *Make sure your ForceTrac is properly calibrated before starting.*

Algometry

OVERVIEW

Algometry measures Pressure Threshold (PTM). It quantifies the sensitivity of para-spinal tissues and their tenderness.

CLINICAL GUIDE REFERENCE

The clinical guide gives general guidelines and recommendations for the accurate use of the instrument. It also explains how to prepare the examinee and the procedure to follow.

Chapter: ALGOMETRY

PROCEDURE

Starting the Session

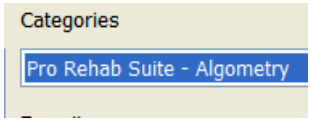
- Connect the sensors to the encoder as follows:
  - **ForceTrac** with **rod attachment** to **channel D**;
  - **Foot pedal** to **channel C**.

A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*
		Pedal	**FTrac**						

- Turn the encoder on.

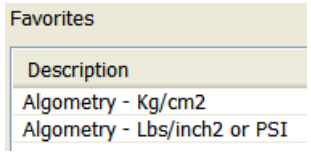
1. Click **Quick Start**.

2. From **Categories**, select **Pro/Flex Rehab Suite - Algometry**.



3. From **Clients**, select a name.

4. From **Favorites**, select the Algometry Protocol.
5. Click **OK**.



***Note**: The force unit (kgs/cm² or lbs/in²) depends on whether you have selected Pounds or Kilogram units in the menu **Options->Force Units**.*

Note: *Make sure your ForceTrac is properly calibrated before starting.*

- Click the **Start** button  and read the instructions on the screen. **Do not press the foot pedal yet.**

- Press the foot pedal to go to the next screen.
- Hold the ForceTrac in your hand.

Force Unit Verification screen

Before you can proceed, you must verify the Force units.

If you use imperial units, press the ForceTrac algometer against a hard surface until it reaches at least 100 Lbs/inch^2 (PSI). If you are unable to reach this value, it means the Force unit is not properly set.

Note: *1 Lbs/inch^2 = 1 PSI.*

- If you can't reach Lbs/inch^2 (PSI), change the force unit to Pounds.
  1. To do this, first end the session and return to the Main Menu screen of BioGraph Infiniti.
  2. Open the **Options** menu and select **Force Units**. The active force unit is the one with the check mark beside it.
  3. To change to **Pounds**, select it.
  4. Then start a new session.

If you use metric units, press the ForceTrac algometer against a hard surface. If you are able to reach at least 14 Kg/cm^2, it means the Force unit is not properly set, and the red light will turn on.

- If the red light turns on, change the force unit to Kilograms.
  1. To do this, first end the session and return to the Main Menu screen of BioGraph Infiniti.
  2. Open the **Options** menu and select **Force Units**. The active force unit is the one with the check mark beside it.
  3. To change to **Kilograms**, select it.
  4. Then start a new session.

- If the red light does NOT turn on, press the pedal to continue.

Note: *pressing the pedal allows you to go to the next screen only if the maximum applied pressure is greater than 3 Kg/cm^2 and less than 14 Kg/cm^2.*

- Position yourself next to the examinee, with the encoder attached to your belt, the pedal near your foot and the ForceTrac in the palm of your hand.

Measuring

1. Repeat the following sequence three times, once for each pressure threshold measure:When the session ends, a series of message prompts guides you through the process of saving data, adding notes to the session file, and switching to reviewing mode so that you can generate a session report.

Generating a report

Hardware Specifications

MyoScan/MyoScan-Z EMG Sensors (SA9503M/SA9503Z)

Size (approx.)	37mm x 37mm x 12mm (1.45” x 1.45” x 0.45”)
Weight	15g (0.5 oz)
Input impedance	≥10GΩ in parallel with 10pF
Input range	0 – 2000μVRMS
Sensitivity	<0.1μVRMS
CMRR	>130dB
Channel bandwidth	10Hz – 1kHz
Signal output range	0 – 1.0VRMS
Input / output gain	500
Supply voltage	7.26V (± 0.02V)
Current consumption	0.7mA (± 0.25mA)
Accuracy	±0.3μVRMS ±4% of reading @25°C to 30°C

MyoScan-Pro EMG Sensor (SA9401M-60 or SA9401M-50)

Size (Approx.)	37mm x 37mm x 15mm (1.45” x 1.45” x 0.60”)
Weight	25g (1 oz)
Input Impedance	10GΩ in parallel with 10pF
Input Range	0 – 400μV_{RMS}, 0 – 1600μV_{RMS}
Sensitivity	<0.1μV_{RMS}
Bandwidth	20Hz – 500Hz
Accuracy	±5%, ±0.3μV_{RMS}

EKG Sensor (SA9306M)

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

HR/BVP Flex/Pro Sensor (SA9308M)

Length (approx.)	20mm x 34mm x 10mm (0.72” x 1.33” x 0.41”)
Weight	20g (0.66 oz)
Input range	Unit less quantity displayed as 0% – 100%
Accuracy	±5%

Respiration Sensor (SA9311M)

Size (approx.)	132cm (52” long)
Weight	30g (1.0 oz)
Range	30% – 65%

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)
Accaccuracy	±1.0°C (±1.8°F) 20°C – 40°C (68°F – 104°F)

InclinoTrac/Dual-InclinoTrac (SA7650/ SA7655)

Dimensions	32mm x 18mm x 71mm
Weight	26g
Range	± 180°
Accuracy (operated in vertically-oriented plane) ≤ 2.0° (dual mode, angle difference)	≤ 1.0° (standalone mode)
Output gain	4.44mV / degree inclination
Output voltage span	2.200 ± 0.8V
Power supply	7.26V
Current consumption, maximum	9.5 mA (standalone mode) 19.0 mA (dual mode)
Link cable	RJ-11, 2 pairs, reversed (this is not a standard telephone cable)

ForceTrac (SA7600)

Dimensions	93mm x 63mm x 25mm
Weight	94g
Input range (force)	0–100 lbf
Safe overload	250 lbf
Accuracy	± (0.1lbf + 5% of reading)
Zero-level output	2.048V
Full scale output swing	1V at 100 lbs load
Power supply	7.26V
Algometer Attachment:	
Dimensions	69mm x 11mm (diameter)
Weight	14g
Material	Aluminum
Flat Tester Attachment:	
Dimensions	9mm x 42mm (diameter)
Weight	39g
Material	Neoprene
Curved Tester Attachment:	
Dimensions	19mm x 42mm (diameter)
Weight	52g
Material	Neoprene

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

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

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 Infiniti encoder or the 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

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.

In the USA, ship insured to:

Thought Technology Ltd.
Cimetra LLC
20 Gateway Drive
Plattsburgh, New York
12901 USA

In Canada, ship insured to:

Thought Technology Ltd.
2180 Belgrave Avenue
Montreal, Quebec
Canada H4A 2L8

For international:

- Package must be marked "**Broker: Livingston International – 133461**"
- Ship insured to:

  Thought Technology Ltd.
  2180 Belgrave Avenue
  Montreal, Quebec
  Canada H4A 2L8

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 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 _____

_____

_____

_____

_____

_____

_____

_____

_____