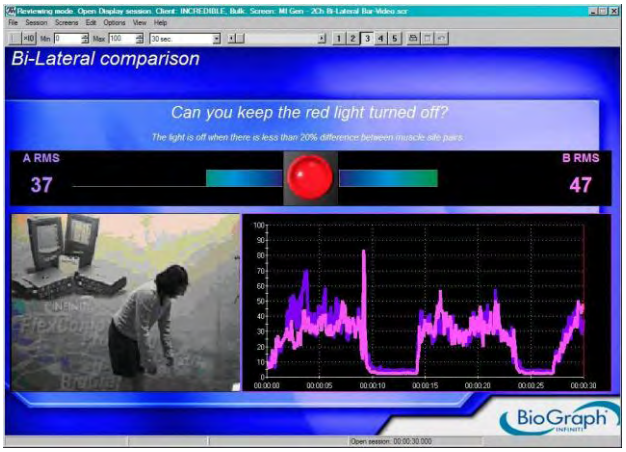
Rehab SUITE™

Hardware & Software Manual



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MyoTrac3™

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Product Name: MYOTRAC3 REHAB SUITE

REF T9920

Device Name: MYOTRAC3

Device #: SA9900

EC REP

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The Netherlands
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CLASSIFICATION

- Type BF Equipment
- Internally powered equipment
- Continuous operation

- Read Instruction Manual

CAUTION

- 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 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 etc.
- 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 MyoTrac3 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 re-usable EMG electrodes, particularly if abrasive substances are used. In all cases, refer to your facility's infection control procedure.
- Radiated radio frequency electromagnetic fields can cause performance degradation in the MyoScan-Pro EMG sensor. In the worst case, an RF field strength of 22mV/M can cause a degradation of 1μV in the signal from the MyoScan-Pro sensor. Be sure to keep in mind that a very relaxed muscle should provide an EMG reading of approximately 1-3μV.
- 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.

ATTENTION

- To prevent static discharge from damaging the sensor and/or encoders, use anti-static 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.
- 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 nuts are tightened firmly.
- 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.

- 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 & Muscle Re-Education purposes.

CONTRAINDICATIONS

- Bladder or Vaginal infection
- Pregnancy
- Menstrual Period
- Patients with limited or impaired physical and mental capacity

NOTE

- Wipe encoder with a clean cloth.
- No preventive inspections required, qualified personnel must perform maintenance.
- 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.

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Introduction

SEMG biofeedback involves measuring the subject's muscle tension and conveying such information to them in real-time in order to raise their awareness and conscious control of the related movement. It accelerates both the therapist's instruction to the patient, and the patient's ability to complete specific movements. Its role in controlling urinary and fecal incontinence is widely recognized and well-established.

By providing the user, and their therapist, access to muscular information about which they are both generally unaware, SEMG biofeedback provides accurate, reliable, measurable, objective data to augment and support the subjective reporting of the patient and observations of the therapist.

Microvolt (millionths of a volt) measurement values of muscle activity can be recorded and used to provide instant feedback for motivation, learning and improved rehabilitation. They can also be turned into trend reports (within and/or across sessions) to demonstrate with objective numbers the value of the therapy both to the patient and to the service provider or payer.

OVERVIEW

The first portion of this manual will help you get your MyoTrac3 system up and running, and provide you with the basics of how to use the main features of the BioGraph Infiniti software:

- Installation and System Requirements
- Getting Started

The second portion describes protocols (for assessment and training) for two applications:

- Part I : Skeletal Muscle Rehabilitation
- Part II : Treatment of Incontinence

SPECIAL THANKS

We would like to thank the clinicians of the Biofeedback Foundation of Europe, and especially Pedro Teixeira, for their valuable contribution.

Pedro Mateus Pereira de Lima Teixeira: Licensed Physical Therapist in Porto, Portugal and BFE Project Manager for International Research & Education on EMG.

Installation and System Requirements

If you do not have the BioGraph Infiniti software setup in your computer, please follow the Installation Instructions provided to install the program. Then follow similar steps to install the Rehab Suite.

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

- Desktop or laptop with two monitor capacity.
- CPU: 1.8GHz dual core processor or faster
- Operating systems:
  - Microsoft® Windows® 7 Home Premium, Business, Ultimate, or Enterprise
  - Microsoft® Windows Vista® Home Basic, Home Premium, Business, Ultimate, or Enterprise with Service Pack 2
  - Microsoft® Windows® XP Professional or Home Edition with Service Pack 3
- DirectX 9c or later (if this is missing, it will be installed with BioGraph Infiniti)
- 50 – 60 gigabytes hard disk space for video recording and processing. (The software needs 2.5 gigabytes to install and run)
- Minimum RAM: 1 GB (Windows® XP) or 2 GB (Windows Vista® or Windows® 7)
- CD ROM or DVD drive
- Video Card (minimum XGA, 1,024 x 768 monitor resolution)
- 32 bit compatible sound card & speakers
- 1 to 4 USB ports, depending on the desired number of Pro/Flex Infiniti encoders
- 1 to 4 serial com ports, depending on the desired number of ProComp+ encoders.
- Mouse or compatible pointing device
- Microsoft® Office with Word® and Excel® (for report generation and printing)
- Compact Flash Reader (for use with compact flash card only)
- Webcam 30 frames per second (for video purposes only)
- Internet access (for updating software and receiving technical support)

PLEASE NOTE:

- *When using Windows® 7 Home Basic or Business or Windows Vista® Home Basic or Business, additional codecs must be installed to view camera and DVD.*
- *Low speed CPUs (1.8 GHz or less) may be sluggish when running screens with multiple instruments.*

This list shows the requirements for running BioGraph Infiniti 5.1 at the time this manual was written.

Update Information

Periodically, updates may become available for the BioGraph Infiniti software. Please contact your local distributor or visit our website www.thoughttechnology.com for further information on how to obtain updates.

Getting Started

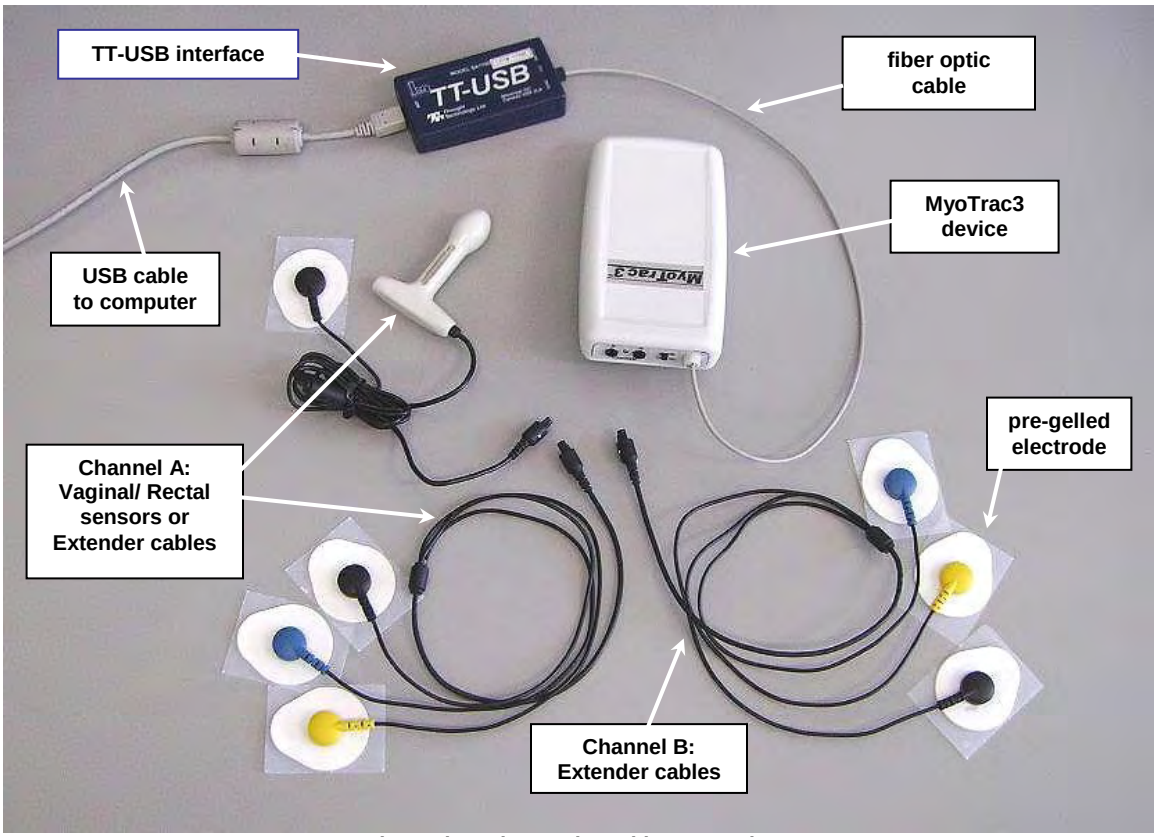
The purpose of this guide is to help you set up your MyoTrac3 system, and to provide you with a rapid overview of the main functions of the BioGraph Infiniti program. Please refer to the on-line help manual for a more detailed description of all the functions and features of the program.

To open the on-line help, simply press the F1 function key, on your keyboard, from any dialog box in the program. Because the on-line help manual is designed to provide contextual information, it will be automatically opened at the section that discusses the dialog box from which the help was called. Also, please consult the manual that came with your MyoTrac3 unit.

***Note**: Important safety information about operating your system is provided in the front matter of the manual starting on page i.*

SETTING UP THE MYOTRAC3™ SYSTEM

The following pictures illustrate the connection of the entire MyoTrac3 system. See the following pages for details about how to connect the MyoTrac3 device to the computer, then how to attach the sensors to the patient and the MyoTrac3 device.



Electrode and extender cable connections

Connecting USB cable (unit to computer)

1. Loosen the **Output** jack collar on the MyoTrac3 device and insert the fiber optic cable into the jack.

When the jack is loose, the cable should be inserted up to the ring marked on the fiber optic cable (about ¾ of an inch).

***Note**: Ensure that the cable is inserted all the way into the jack and that the jack collar is screwed down firmly, but do not over tighten.*

Be sure that the ends of the fiber optic cable are cut cleanly and evenly, otherwise you may not get a proper connection (if necessary, do this with a sharp razor blade or X-acto™ blade; do not cut with scissors).

2. Insert the other end of the fiber optic cable into the TT-USB Interface.

***Caution**: Do not bend sharply or wind the fiber-optic cable in a loop tighter than about 4 inches. Doing so can damage the cable and prevent the MyoTrac3 device from functioning properly.*

3. Plug the TT-USB Interface into the USB port of your computer.

   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.

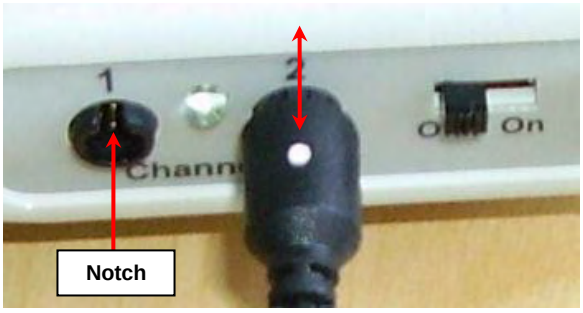
***Note**: USB ports are marked with the symbol* .

MyoTrac3 device and TT-USB interface connections

Connecting the extender cable (unit to electrodes)

When connecting an extender cable, make sure to properly line up the guiding dot on the top of the plug with the notch in the device's input socket.

Forcing the plug into the jack in any other position may damage your equipment.



Configuring the internal switches

The MyoTrac3 device allows you to set the bandwidths for Channel A and Channel B by using the dipswitches in the battery compartment. Channel A represents the pelvic muscles sensor (vaginal or rectal sensor or perianal extender cable) and Channel B represents the extender cable you have placed on the abdomen, thigh or gluteal muscles.

The default manufacture setting for the filter dipswitches is on the ON position. This defines a wide bandwidth of 20-400Hertz (Hz) for both channels. This is the recommended filter setting. Switching to the narrow bandwidth (100-400Hz) on channel B will be preferable when using an abdominal electrode placement since activity resulting from the heart muscle might be picked up and create unwanted interfering signals. The narrow bandwidth will filter this out.

***Note**: Using the narrow bandwidth for the vaginal, rectal or perianal sensor may cause important information to be missed. Channel A's dipswitch should always be set to the wide bandwidth (position 1, up) as it is used for measuring the pelvic floor muscles.*

The third switch is used to define the notch filter. This will remove any noise interference caused by nearby electrical devices. The usual notch filter setting for **North America is 60Hz**. The electrical power system of most **European countries functions at 50Hz** and so the switch setting would have to be changed.

Internal Switch Settings:

a. Dip1 ON - Filter CH A, 20-400Hz
   Dip1 OFF - Filter CH A, 100-400 Hz

b. Dip2 ON - Filter CH B, 20 - 400Hz
   Dip2 OFF - Filter CH B, 100 - 400Hz

c. Dip3 ON - Line Filter 50Hz
   Dip3 OFF - Line Filter 60Hz

d. Dip4 Reserved for future use.

Inserting the Battery

The MyoTrac3 device requires one 9 Volt battery for power. The device operates best when you use alkaline batteries, since Nickel-Cadmium (Ni-Cad) rechargeable batteries generally do not provide sufficient sustained charge.

1. Slide the bottom panel towards the back of the device.
2. Insert the 9 Volt battery in the compartment, making sure to properly orient the positive (+) and negative (-) contacts of the battery on the springs in the compartment.
3. Replace the cover.

You can test the battery installation by turning the device on. The small LED between the Channel connectors will light up. Upon power-up the MyoTrac3 Device will read the settings of the switches in the battery compartment and set the internal filters accordingly.

FIRST TIME RUN

Before you begin

Ensure that BioGraph Infiniti 5.1 and the Rehab Suite have been installed on your computer.

To ensure compatibility with the Windows Vista® and Windows® 7 operating systems, from version 5.0 forward, BioGraph Infiniti installs a different file structure from previous versions. As a result, only the Rehab Suite with the version number 5.0 or later can be installed after BioGraph Infiniti 5.1 has been installed on your computer.

- **If this is the first time that you have installed BioGraph Infiniti**

  Confirm that your Rehab Suite is also version 5.1. This indicates that the Rehab Suite has been modified to incorporate the changes to the BioGraph Infiniti system file structure and that all channel sets, screens, and scripts are compatible with BioGraph Infiniti 5.1.

- **If you are updating BioGraph Infiniti from a version earlier than 5.0**

  The process will also update the file structure of any previously-installed version of the Rehab Suite (i.e., version 4.0 installed with BioGraph Infiniti 4.0). After you have updated BioGraph Infiniti to version 5.1, you cannot install a Rehab Suite with a lower version number than 5.0.

  If you need to install an older version of the Rehab Suite after installing BioGraph Infiniti 5.1, or if you have problems installing your Rehab Suite, check for a solution in the FAQ section of the Thought Technology website or contact our Technical Support.

Starting the system

After making the necessary connections briefly described above, turn on your MyoTrac3 unit.

Start the BioGraph Infiniti software. To do this,

- Select BioGraph Infiniti in the **Start Menu** under **Program Files\Thought Technology\Infiniti**.
- Double-click on the BioGraph Infiniti icon on the Desktop.

The program always starts in the **Main Menu** window.

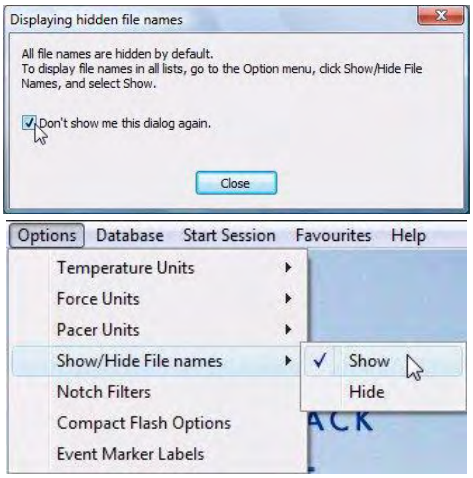
Anywhere in the software, you can access ***contextual on-line help*** by pressing the F1 key on your keyboard.

Configuring the system

The first time you start BioGraph Infiniti, you have to configure your system. This takes only a few minutes.

Show/Hide File Names:

- Select **Options** at the top left of the main screen.
- Select **Show/Hide File names** from the drop-down menu.
- Select **Show** or **Hide**, according to your preference.



Enable the **Notch Filter Settings**:

A notch filter is applied to certain raw signals to remove electrical interference caused by the frequency used to transmit electricity.

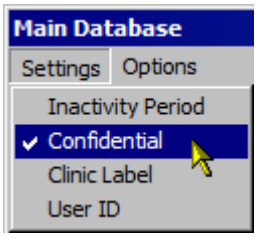
- Select **Options** at the top left of the main screen.
- Select **Notch Filters** from the drop-down menu.

- Select **EMG** and set **Frequency** to **50Hz** or **60Hz**, depending on the transmission frequency used in your country (60Hz for North America, for instance). Then click **OK**.

***Note**: These settings stay in effect unless you change them.*

Notch Filter Options

Optionally, enable the **Confidential** setting. This helps protect the privacy of your clients by masking their names in the client database.



- Click **Database** to open the **Main Database** window.
- From the **Settings** menu, select **Confidential**. The check mark indicates that the setting is enabled.

If you need to disable the **Confidential** setting, repeat these steps to remove the check mark.

Clients:

Full Name	ID Num...
Ballance, Tara	1
Florimond, Dorian	4
Dorimond, Florian	6
Physiology, Jane	9

With the Confidential setting disabled

Clients:

Full Name	ID Num...
Ba******, T***	1
Fl*******, D*****	4
Do******, F*******	6
Ph********, J***	9

With the Confidential setting enabled

Entering the key codes

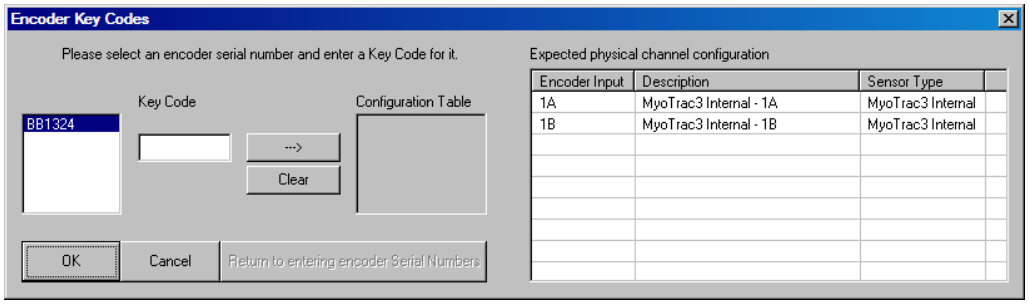
The first time you start to record a session with BioGraph Infiniti, the software will check for the key codes and ask you to enter them. You will also be asked to enter key codes if you have uninstalled and reinstalled BioGraph Infiniti, or if this is the first time you are using your MyoTrac3 unit with your existing installation.

There are three ways to start recording a session. They are described fully in the next section of this manual.

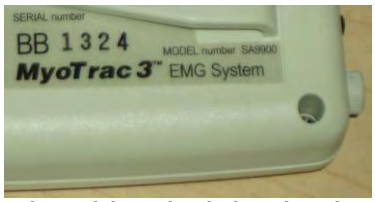
- **Quick Start**: Click this option to record a Favorite session (page 8).
- **Start Open Display Session**: Click this option to record an unscripted session using your own selection of feedback screens (page 11).
- **Start Script Session**: Click this option to record a script session (page 9).

Choose a method to start recording a session.

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



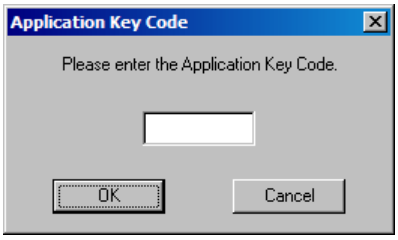
2. Click to highlight your unit's serial number in the left table (in this example, BB1324; this is the same number as on the back of the unit).



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

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. The serial number should now appear in the **Configuration Table**.
5. When done, click **OK**.
6. Now the **Application Key Code** dialog box opens.
7. Enter the **Application Key Code**.

   This number is found in the battery compartment with the encoder key code.
8. When done, click **OK**.



***Note**: Even if you are using more than one encoder, you need to enter only one Application Key Code.*

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.

RECORDING A SESSION

Two types of sessions can be recorded with BioGraph Infiniti.

- ***Open Display*** sessions are generally used for biofeedback training, when flexibility is important and you need to be able to rapidly change the session parameters, depending on the client's reactions. The kinds of feedback include various types of audio, such as music, tones, sounds and voice prompts. There are also visual media, such as animations, and different graphs that change color when the signals pass their threshold markers.
- ***Scripts*** allow the development of predefined protocols that provide clinicians the ability to group together varied types of activities with specific display screens. The results produce a set of statistics that can be trended across sessions to reflect patient progress and to help determine the type of exercise and/or practice that is needed by the patient.

The type of session you select depends on what you need to do. Each type of session will be described in more detail in the following sections of the manual.

Starting a session from a Favorite

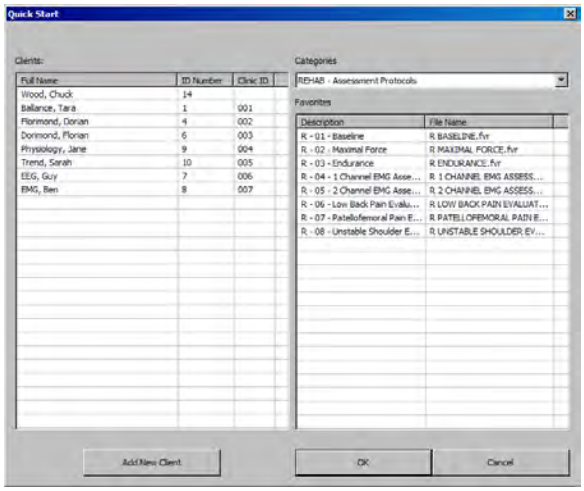
A **Favorite** is a predefined session configuration that contains all the settings needed for recording, replaying, and reviewing a session. Depending on the session type (script or open display), these settings can include scripts, channel sets and screens, statistics for session reports, auto-rejection settings for review mode, and Excel data export options. Favorites are intended to simplify and standardize the process of recording and reviewing sessions.

The Rehab Suite includes a number of preset open display and script sessions called Favorites. You can find them listed in the Favorites table when you click the **Quick Start** button on the main BioGraph screen.

To start a session from a **Favorite**:

1. Click the **Quick Start** button on the main screen.
2. Select a name from the list of **Clients**.
3. Optionally, choose a **Category** from the drop-down list. Only the favorites belonging to the category will display.
4. Select a **Favorite** from the list.
5. Click **OK**.

   If there is no problem with your encoder or sensor connection, the recording screen will open.

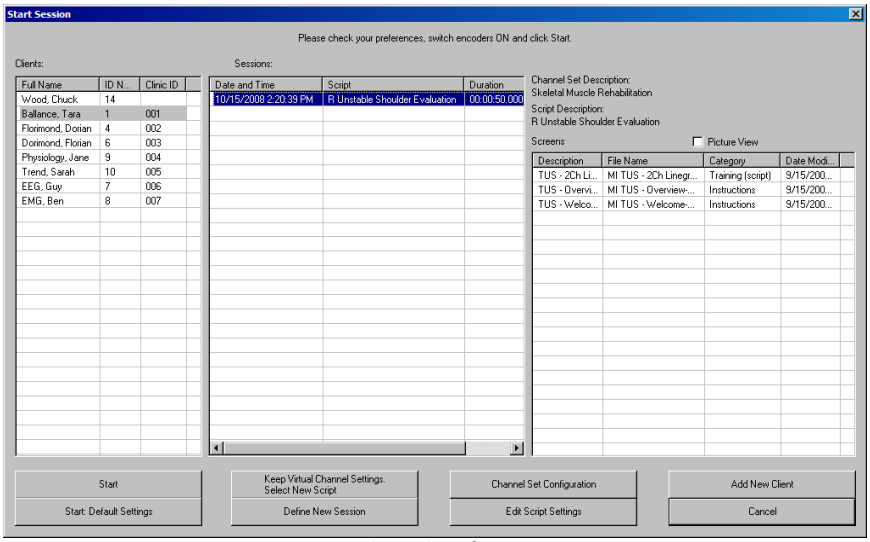


***Note**: If this is the first time you are recording a session, at this point the system will prompt you to enter key codes. See page 7 for more details.*

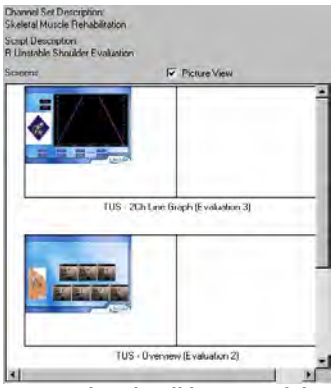
6. Start recording by clicking on the ***Start*** button in the toolbar.

Starting a Script Session

Select **Start Script Session** from the Main Menu screen. This opens the **Start Session** screen where you go through the process of selecting a client file and script, setting up session parameters, and launching recording mode.



Start Session



To see thumbnail images of the screens used in the chosen script, select *Picture View*.

To record with a previously recorded script:

1. Select a **Client**.
2. Select a previously recorded script session from the **Sessions** list.
3. Click one of the following **Start** options:
   - **Start** to rapidly start a new session with the same display screens and script settings as the selected session. These include any changes you made to the client settings.
   - **Start: Default Settings** to start a new session with the default channel set settings instead of any changes you made to the client settings for the selected session.
   - **Edit Script Settings** to modify script step durations and select different screens for specific steps of the selected script (see Changing Script Settings, page 17).

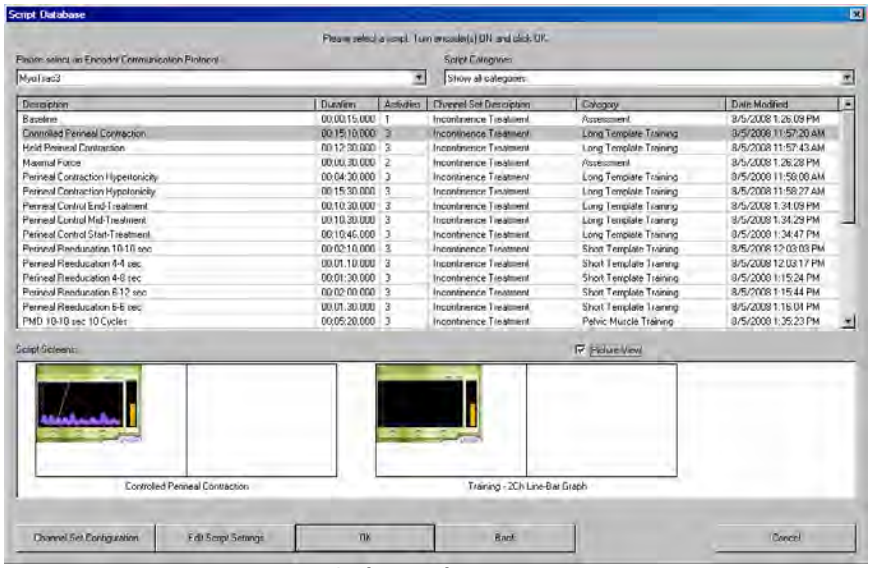
***Note**: If this is the first time you are recording a session, at this point the system will prompt you to enter key codes. See page 7 for more details.*

4. When the recording screen opens, start the script by clicking on the **Start** button , and follow the on-screen instructions.

To record with a new script:

1. Select a **Client**.
2. Optionally, select a previously recorded script session from the **Sessions** list.
3. Click one of the following **New Script** options:
   - **Define New Session** to select a new script.
   - **Keep Virtual Channel Settings. Select New Script** to keep the client's channel set and settings but select a different script.

   The **Script Database** window opens.



Script Database

4. Select **MyoTrac3** as the encoder communication protocol from the drop-down list at the top.
5. Optionally, choose a **Script Category** from the drop-down list. Only the scripts belonging to the category will display.
6. Select a script from the list, and click **OK**.

***Note**: If this is the first time you are recording a session, at this point the system will prompt you to enter key codes. See page 7 for more details.*

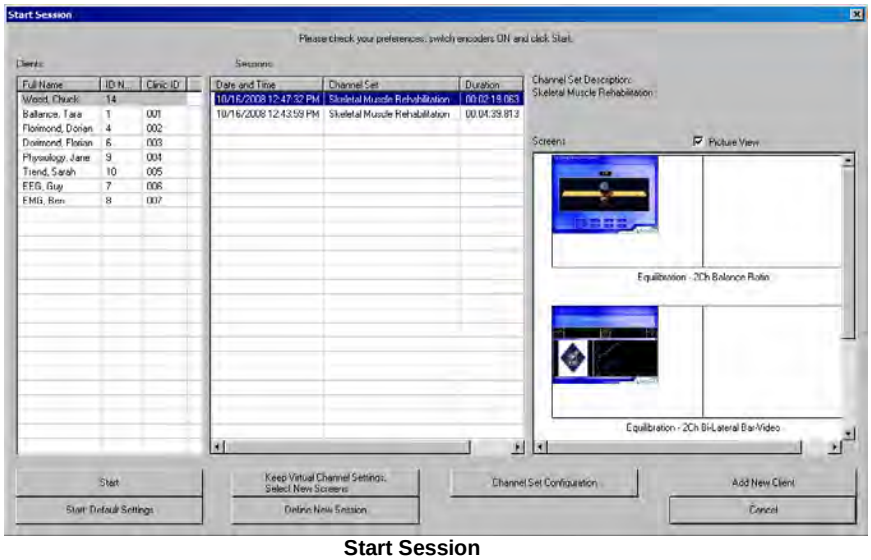
7. When the recording screen opens, start the script by clicking on the **Start** button , and follow the on-screen instructions.

To record with a new client:

1. Click **Add New Client**, in the **Client Data** screen enter at least the person's first and last name, and click **OK**.
2. Select the new **Client** from the list.
3. Click **Define New Session** and when the **Script Database** opens, follow the remaining steps to record with a new script.

Starting an Open Display Session

Select **Start Open Display Session** from the Main Menu screen. This opens the **Start Session** screen where you go through the process of selecting a client file and channel set, setting up session parameters, and launching recording mode.

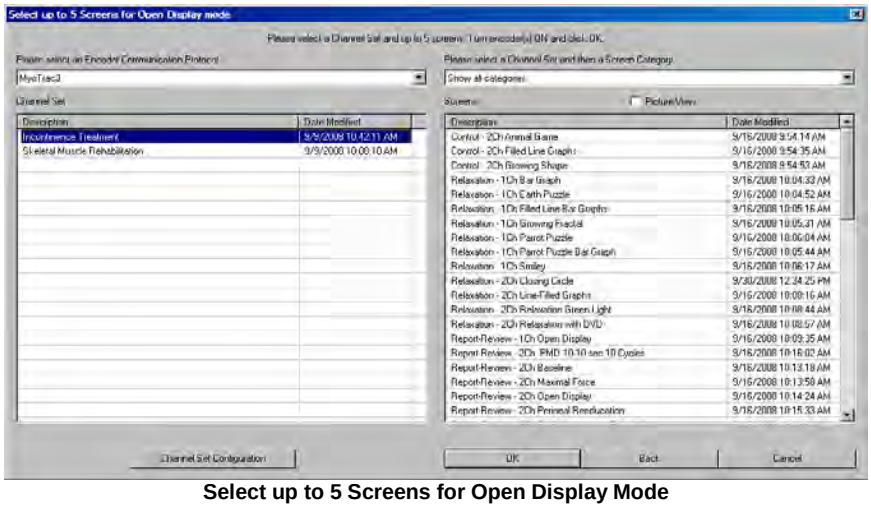


Start Session

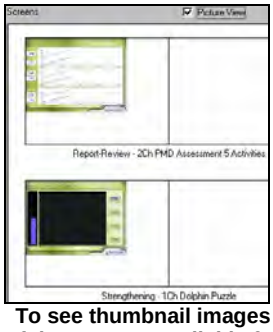
To record a new session:

1. Create a new client as described above, or select an existing client from the list.
2. Select **Define New Session** to open the window.

   The **Select up to 5 Screens for Open Display Mode** window opens.



Select up to 5 Screens for Open Display Mode



To see thumbnail images of the screens available for the chosen channel set, select *Picture View*.

3. Select **MyoTrac3** as the encoder communication protocol from the drop-down list at the top.
4. Highlight a **Channel Set** on the left. There is one channel set for skeletal muscle rehabilitation and another for treatment of incontinence.
5. Optionally, choose a **Screen Category** from the drop-down list. Only the screens belonging to the category will display.
6. Choose one to five **Screens** from the list, and click **OK**.

   To select more than one screen, press down the CTRL key while clicking with the left mouse button.

***Note**: If this is the first time you are recording a session, at this point the system will prompt you to enter key codes. See page 7 for more details.*

7. When the recording screen opens, start recording by clicking on the **Start** button .

ENDING A SESSION

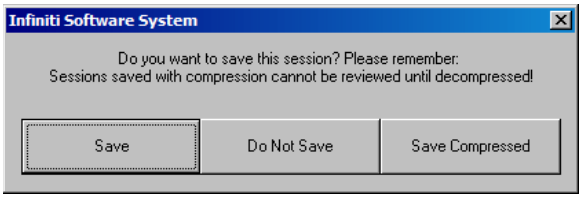
No duration is set for an **Open Display** session. It must be stopped manually by clicking the **Stop** button .

The duration of a **Script** session is set at the time the script is defined. When the script reaches its end, recording will automatically stop.

When the session ends, the following series of message prompts will appear and guide you through the process of saving data, adding notes to the session file, and, optionally reviewing the data or recording another session.

1. **Save session data:**

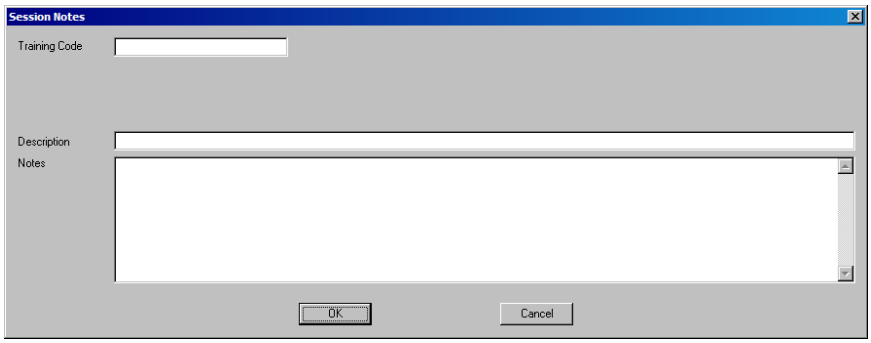
   You can save the session in compressed format but, unless your hard drive has very little space available or you do not need to review the saved sessions, we recommend that you always **Save**, which uses non-compressed format.



   Compressed files can't be replayed, reviewed or trended until they have been decompressed.

2. **Enter *Session Notes*:**

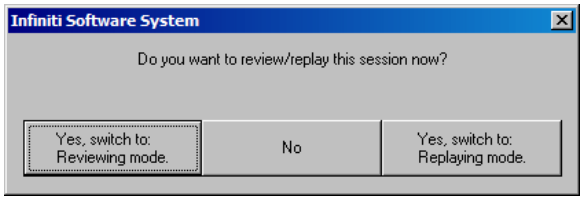
   Here you can enter, if you want, a treatment code, a session description and some notes. Click **OK** to continue.



3. **Review or replay the session:**

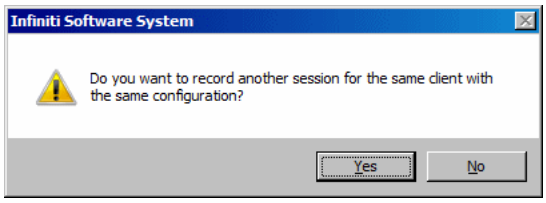
   You have the option to analyze the session data at this point. You can switch to review mode or replay mode.

   After you review the data and close the viewing screen, the program displays the next message prompt.



4. **Record another session with the same settings:**

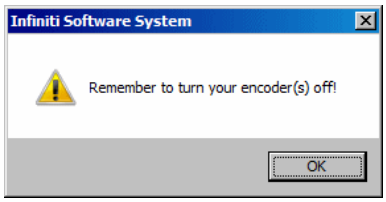
   - If you selected **No** at the previous message, the program asks if you want to record another session with the same settings.
   - If you select **Yes** at this point, the recording screen will reopen.



5. **Turn off your encoder:**

   If you selected **No** at the previous message, the program prompts you to turn your encoder off.

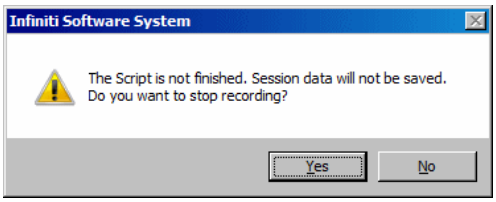
   Click **OK** to return to the Main Menu screen.



You can also manually stop recording a script session by clicking the **Stop** button .

In this case, you are prompted to confirm the command.

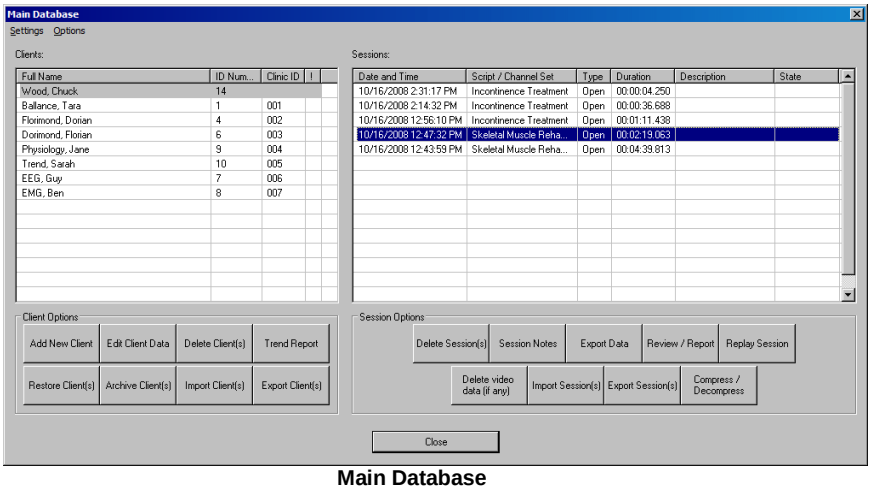
- If you select **No**, the script continues recording normally.
- If you select **Yes**, no data is saved for the session, and you are prompted to record another session with the same settings (message 4, above).



REPLAYING SESSIONS

Replaying a session allows you to play back a recorded session like a movie. This is especially useful if you have recorded video with audio data. You can replay the session from any point in time and skip to event markers or script activities and steps.

1. Select **Database** from the Main Menu screen.
2. In the **Main Database** window select the client whose session you want to replay.
3. Select the session from the right-hand table.
4. Click on **Replay Session** at the bottom.



Main Database

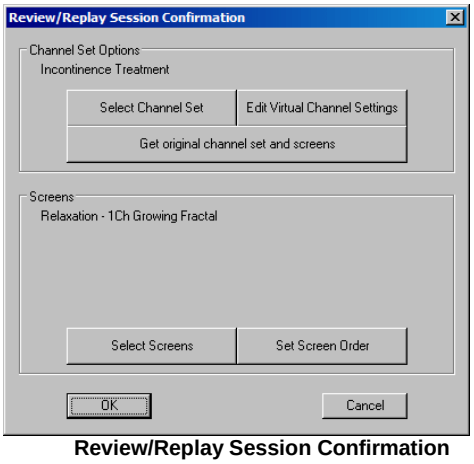
5. The next step depends on whether you selected a **Script** session or an **Open Display** session to replay.
   - If you selected a **Script** session, the window **Edit Channel Set Setting for Current Client** opens.

     Click **Close** to enter replaying mode.

- If you selected an **Open Display** session, the window **Review/Replay Session Confirmation** opens.

  To replay the session using different screens from those used to record it, click **Select Screens** to open the **Select Screens** window. Select up to 5 screens and click **OK** to return to **Review/Replay Session Confirmation**.

  Click **OK** to enter replay mode.



Review/Replay Session Confirmation

6. Click on the **Start** button to replay the session.

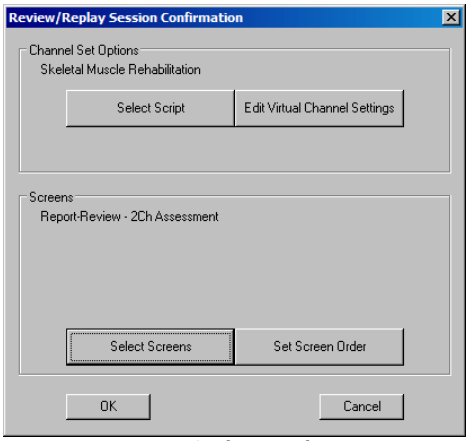
REVIEWING SESSIONS

After recording a session you can analyze the data by going into review mode. This mode allows you to scroll through the graphs, look at statistics, and print out a report displaying the data in graphical and/or statistical form.

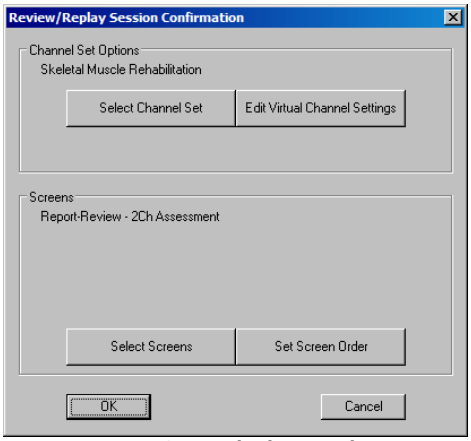
Review

1. Select **Database** from the Main Menu screen.
2. In the **Main Database** window select the client whose session you want to review.
3. Select the session from the right-hand table.
4. Click on **Review/Report** at the bottom.

   The **Review/Replay Session Confirmation** window opens.



For a Script session

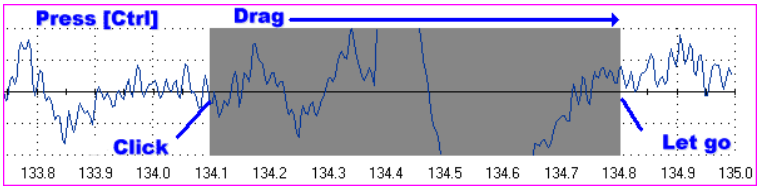


For an Open Display session

5. Click on **Select Screens**.
6. Optionally, from the **Screen Category** drop-down list, select **Report-Review** or **Expert**. Only screens from the selected category will be listed.
7. Select up to 5 screens and click **OK** to return to **Review/Replay Session Confirmation**.
8. Click **OK** to enter review mode.

Rejecting Artifacts

The purpose of rejecting artifacts is to have reliable statistics, with the least amount of noise affecting the recording. Rejecting artifacts can be performed while reviewing sessions. It can be done manually by the person reviewing the data. First review the session to determine where the recording is most affected by noise. Then place artifact rejection segments at these locations, by following these steps.



1. Select the line graph containing the segment to be rejected. (The selected graph will display a magenta border.)
2. Press and hold the **[Control]** Key.
3. Place the cursor over one end of the rejected segment.
4. Click and hold the left mouse button. (You can release the **[Control]** key at this point.)
5. Drag the cursor across the segment to be rejected. The selected segment is highlighted in gray.
6. At the end of the segment, release the mouse button.

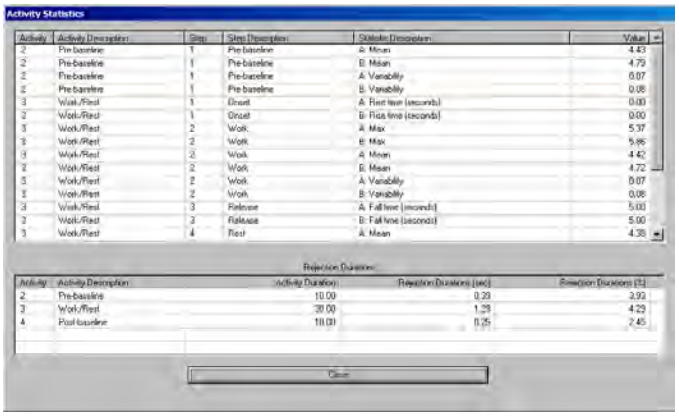
***Note**: You can place artifact rejection segments only on single-line graph instruments. If you get an error message, you have to select a different screen for reviewing.*

Calculating Statistics

1. To calculate statistics for a session, click the **Calculate Statistics** button in the tool bar.

   A message confirms that the program is processing session data and then the **Statistics** window opens.

2. Click **Close** to close the window.



***Note**: This is the Statistics window for a script session. The Statistics window for an open display session is similar, but does not display a list of rejection durations for individual activities.*

Generating Session Reports

In review mode BioGraph Infiniti 5.1 can generate two types of session report.

- **Text reports** are a standard feature of the software. A text report includes general information about the session as well as optional information (session notes, statistics, markers) that you select. Text reports are generated from Microsoft Word templates, and can be saved or printed using the Word functions.

  A text report can be generated from any screen which includes line graphs or trend graphs. The Rehab Suite includes many screens designed for generating reports, one for every type of training protocol. The various training and reporting screens are described below, in the ***Screen Description*** section.

- **Excel reports** must be user-defined, and can be customized for specific analytical uses. The Rehab Suite does not contain predefined Excel reports.

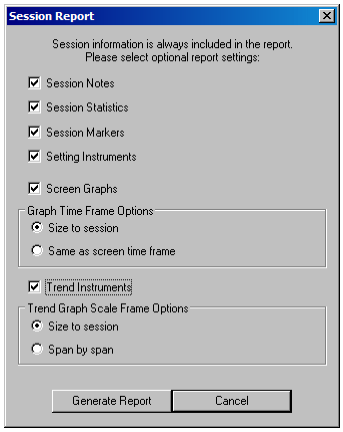
Text Report

This type of report is generated in review mode. You can enter review mode in one of two ways:

- Immediately after recording a session (see ***Ending a Session***).
- From the Database window by selecting **Review/Report** (see ***Reviewing a Session***).

When the Main Frame screen opens in Review Mode, follow these steps:

1. If this is an open display session, from the **Options** menu select **Set Open Display Statistics** and choose the channels for which statistics should be calculated. (For a script session, statistics are defined in the script.)
2. If necessary, perform artifact rejection on the recorded data.
3. Click the **Calculate Statistics** icon in the tool bar to recalculate the statistics.
4. If you have loaded more than one screen, 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 **Generate Text Report**. The **Session Report** window opens.
6. Select report components by placing a check mark in the desired boxes.
7. 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.

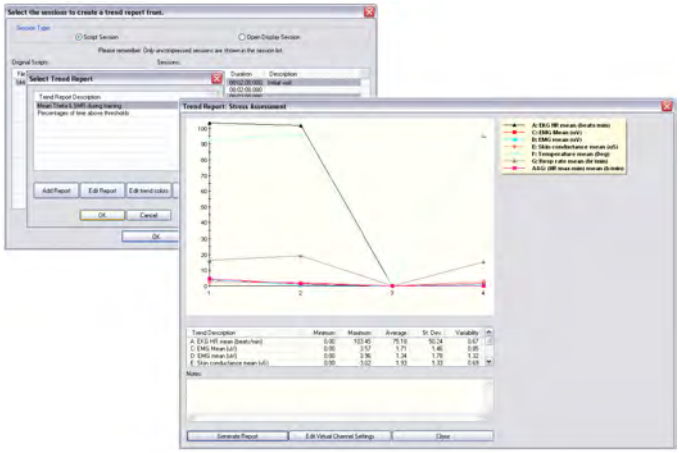


***Note**: Microsoft Word **must** be installed on your system for this function to work.*

Generating Trend Reports

The purpose of trend reports is to compare statistics across different activities in the same or multiple scripted sessions. To generate a trend report, follow these steps:

1. From the **Database** screen, select a client file and click on **Trend Report.**
2. Select the type of session to be trended by clicking on the proper radio button.
3. Choose a file name, and on the right side of the table the sessions recorded will be displayed.
4. Select the number of sessions to be trended using the **[Shift]** or **[Control]** Key, and then click **OK.**
5. In **Select Trend Report**, choose a trend report and click **OK**.
6. **To** generate a report in MS Word, click on **Generate Reports**. You can save or print a copy of the report by using Word's **Save** and **Print** functions.



TOOL BAR OPTIONS

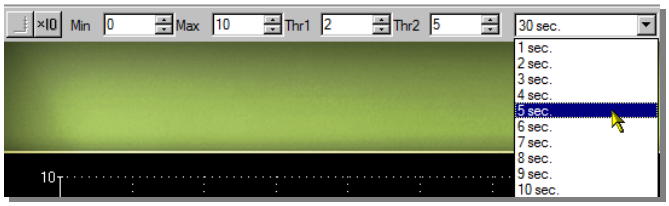
While recording, replaying or reviewing an open display session there are certain options that are available on a tool bar found near the top of the display screen. To learn more about the tool bar, refer to the online help by pressing F1.

Toggling Between Screens

If you have chosen more than one screen you can view each one by clicking on the numerical buttons on the toolbar at the top. Only up to five screens can be viewed (in the example below, there are four, where the third screen is currently on display).

Adjusting Scales and Threshold

By clicking on a graph instrument you can enable any of the scale and threshold options on the toolbar shown below.



- **Vertical scale:** The minimum and maximum scale values can be changed by clicking on the up and down arrows to the right of the text boxes labeled with **Max** and **Min**.
- The numbers increase or decrease by 0.1, but when you click on the button

, the numbers change by 1.
- **Multi line-graph Y1 and Y2 axes toggle:** The multiple line graph has a left and a right vertical scale that can be adjusted independently of each other by clicking on the toggle button.

  Left vertical scale enabled.

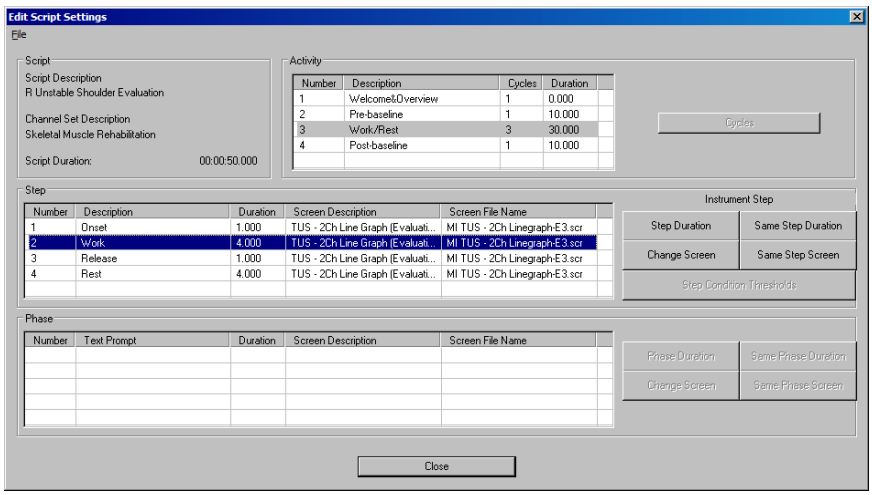
  Right vertical scale enabled.

- **Threshold:** The threshold line on a bar graph, line graph and animation scale 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.
- **Time scale:** The default time for all the screens is 30 seconds. You can select a new time scale by clicking on the drop-down menu.

CHANGING SCRIPT SETTINGS

The number and duration of activities in a given script session can be modified within the BioGraph Infiniti software. You may want to change the screens that appear in a script as well as the duration of the session. The changes are made just before the recording.

1. In the **Script Database** window highlight the script you wish to modify.
2. Click on **Edit Script Settings**.



3. Highlight the activity to access the step(s) you wish to change.
4. Highlight the step and click on **Change Screen** to use a different screen, or **Step Duration** to change the time length. Depending on the type of step, any of these buttons may be disabled.

***Note**: Changes are only saved for that particular session.*

To learn more about this feature please refer to the on-line help manual provided by opening **Edit Script Settings** and pressing F1.

USING A WEBCAM

When you see this logo on a screen in the manual, it means you can use a webcam with this screen. You only need to 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.*

The software searches for a connected video capture device and activates it automatically. A preliminary testing window will pop up, in order to adjust the camera. The video will be recorded with the session and can be reviewed or replayed.

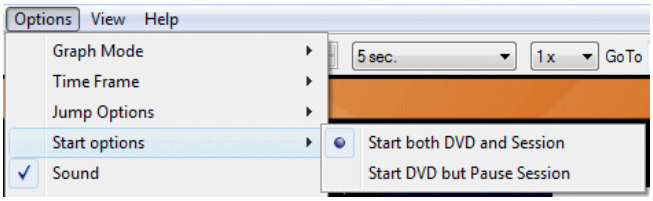
If you have more than one video capture device connected to your system, and want to use a specific one, place the cursor on the video image and click the right mouse button, then select the device from the list:

USING A DVD

When you see this logo on a screen in the manual, it means a DVD can be used with this screen. You only need to insert the DVD in the DVD player of your computer.

When the option **Start DVD but Pause session** is selected, you can launch a DVD, access the DVD menu and start a movie while the program waits in Pause.

When you are ready to start recording data, click the **Pause** button. Recording will begin.



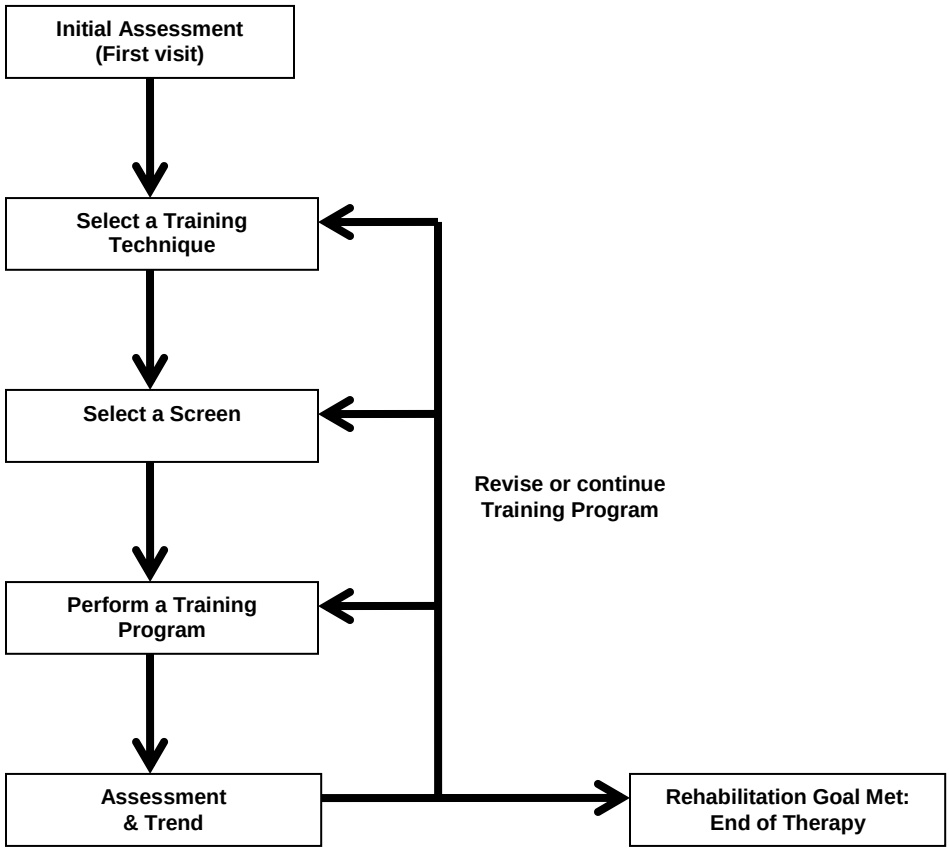
Skeletal Muscle Rehabilitation

This chapter focuses on skeletal muscle rehabilitation.

Two types of protocols are described:

- Assessment protocols
- Training protocols (training techniques)

The following chart suggests how to use the different protocols. Assessment protocols help you to evaluate the condition of your patient, before, during and after the treatment, and to choose the appropriate training technique. For each technique, a choice of various protocols (screens) is proposed, allowing you to adapt the training to the patient and the exercise you want them to perform.



The protocols can be in the form of open display screens (free sessions) or scripts (directed sessions), as described in the *Getting Started* section (in the sub-section *Recording Sessions*, page 8).

All the assessment protocols are scripts. The training protocols are open display screens. For open display screens, select the channel set **Skeletal Muscle Rehabilitation**.

ATTACHING ELECTRODES – PREPARATION FOR TREATMENT

Connect the EMG electrodes to the extender cable, using the adaptors, and connect the cable to one input of the device (see *Setting Up the MyoTrac3™ System*, page 3).

The blue (positive) and yellow (negative) connectors of the extender cable are for the active electrodes, the black one is for the reference.

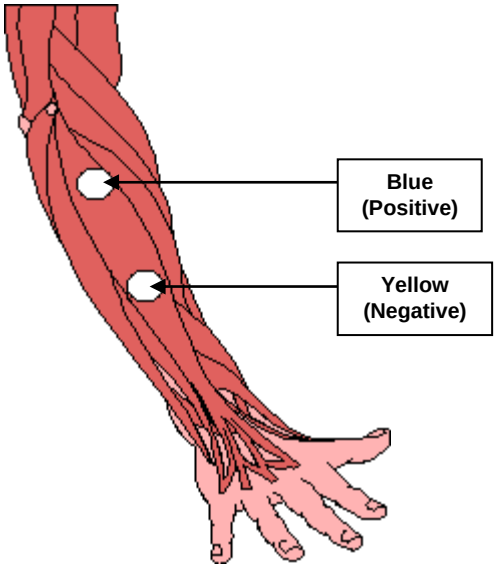
Before applying electrodes, be sure the skin surface is clean and dry. Palpate the muscle to locate it.

Then place the electrodes on the muscle **along the muscle fibers** as illustrated.

Make sure the electrodes are placed firmly on the skin, and make good contact between the skin and electrodes.

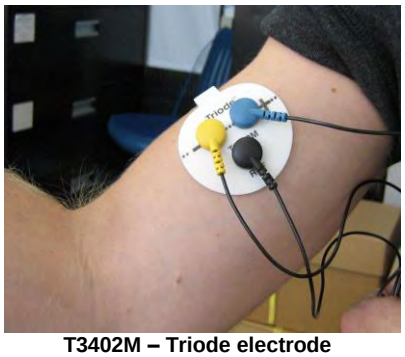
It is recommended to put conductive electrode paste or cream on the EMG electrodes (grey area only) before applying them to the skin.

Then place the reference electrode (black connector) anywhere on the body, but more proximally than the active electrodes (yellow and blue connectors), as shown on the picture.

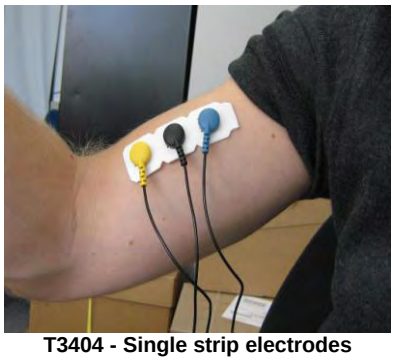


Example of placement for EMG
(Wrist and Finger Extension)

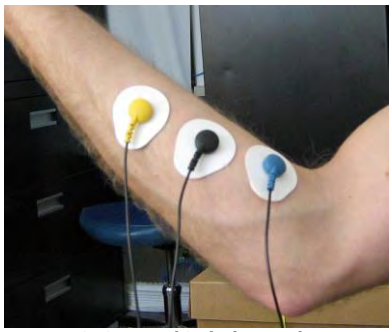
Different types of electrodes can be used, for different types of placements:



T3402M – Triode electrode



T3404 - Single strip electrodes



T3425 - UniGel electrodes

For more examples of electrode placements, please refer to your clinical guide, installed on your computer with the other user documents (click on the **BioGraph Infiniti Docs & Editors** icon on your desktop).

ASSESSMENT PROTOCOLS (SCRIPTS)

The assessment protocols are an asset to the standard examination of your patient. They allow you to objectively quantify and document the state of your patient's muscles.

They will help you to detect hypo-tonicity, hyper-tonicity, faulty timing and faulty multi-muscle contraction, and to decide on the training technique to use.

All the assessment protocols are kept in the **Assessment** script category.

SHORT AND SIMPLE PROTOCOLS

These protocols can be performed at the beginning of each visit. They allow you to quickly assess the patient's muscle condition and get the training parameters of the day (since a patient's condition can change over time).

These are the short and simple protocols (with associated review screens) that can be accessed by clicking the **Quick Start** button.

Category: REHAB – Assessment Protocols

The protocols used with 1 EMG are:

- **R – 01 – Baseline,** with the review screen **1 Ch Baseline**.
- **R – 02 – Maximal Force**, with the review screen **1 Ch Maximal Force**.
- **R – 03 – Endurance**, with the review screen **1 Ch Endurance**.

BASELINE

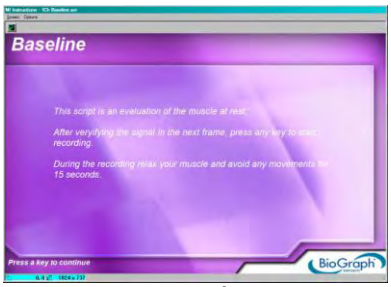
This protocol measures the resting level of the muscle. The patient must be asked to totally relax the muscle.

This protocol calculates two statistics: variability and mean.

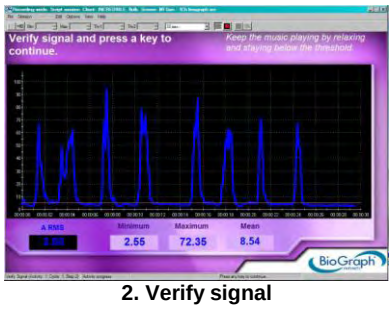
- **Variability** measures the neuromuscular stability. The lower the variability, the more stable the muscle. Since there is no standard value that the variability can be compared to, it is recommended to measure the healthy side and compare both results.
- **Mean** is the average of the resting level throughout the session. This value will help you to detect potential hyper-activity. A healthy muscle should be able to go below 5µV. This resting level can also be used to set up the training goal of the day (see *Training Protocols*, page 28).

The script is divided into 3 steps:

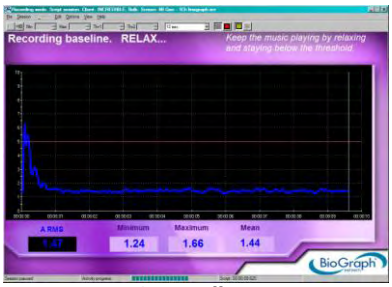
1. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done.
2. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
3. **Baseline:** Relax muscles to determine new resting levels; duration is 15 seconds.



1. Instructions



2. Verify signal



3. Baseline

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12). We recommend entering the name of the muscle in the description field.

You can then review the session with the screen **Report-Review 1 Ch Baseline** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

You can also compare the two muscles, or report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16).

MAXIMAL FORCE

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.

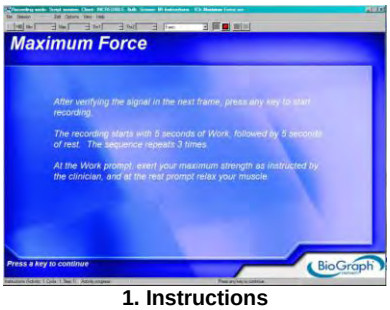
This protocol calculates four statistics: variability, maximum contraction, mean and area under the curve.

- **Variability** measures the neuromuscular stability. The lower the variability, the more stable the muscle. Since there is no standard value that the variability can be compared to, it is recommended to measure the healthy side and compare both results.

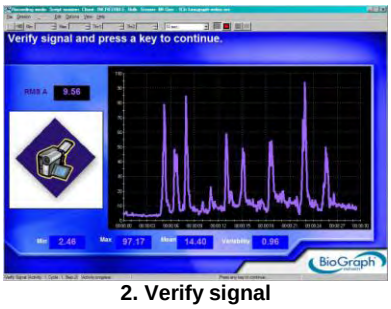
- **Maximum** is the average of the maxima of all contractions. The comparison with the healthy side can highlight potential hypo-activity. This maximum can also be used to set up the training goal of the day (see *Training Protocols*, page 28). The **mean** can also be used.
- **Area under the Curve** during work period indicates the level of energy produced by the contraction.

The script is divided into 3 steps:

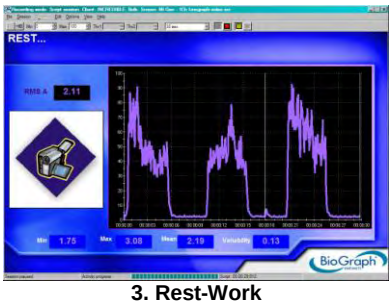
1. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done.
2. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
3. **Rest-work cycle:** The patient relaxes and contracts muscles for 5 seconds, three times.



1. Instructions



2. Verify signal



3. Rest-Work

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12). We recommend entering the name of the muscle in the description field.

You can then review the session with the screen **Report-Review 1 Ch Maximal Force** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

You can also compare the two muscles, or report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16).

ENDURANCE (or RESISTANCE)

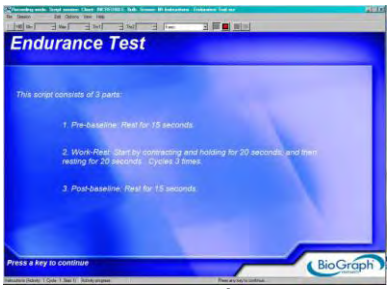
This protocol assesses a sustained contraction. The patient contracts as strongly as they can during an extended period (about 20 seconds). This monitors the recruitment of the slow twitch fibers (muscle endurance). The contraction should be performed against static resistance (isometric contraction).

This protocol calculates three statistics: variability, mean and area under the curve.

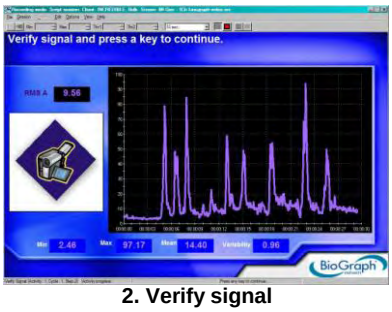
- As with maximal force, **Variability** measures the neuromuscular stability. The **Mean** measures the average intensity of the contraction. Since there is no standard value that it can be compared to, it is recommended to measure the healthy side and compare both results. **Area under the Curve** during work period indicates the level of energy produced by the contraction.

The script is divided into 5 steps:

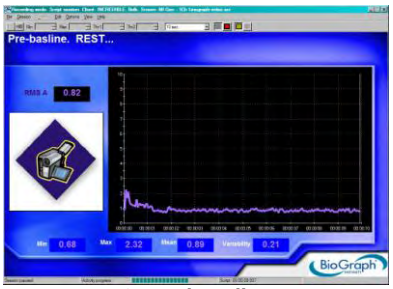
1. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done.
2. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
3. **Pre-Baseline:** The patient must relax.
4. **Contract and Hold:** The patient contracts as strongly as they can during an extended period (about 20 seconds).
5. **Post-Baseline:** Comparison of resting levels (pre/post) assesses the ability to recover.



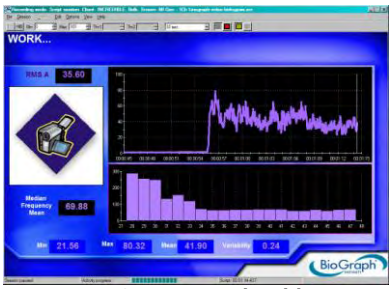
1. Instructions



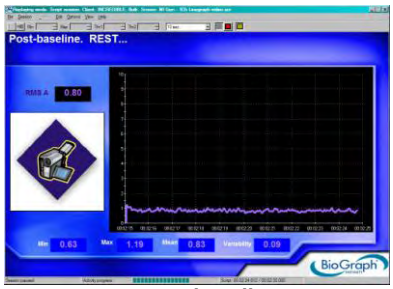
2. Verify signal



3. Pre baseline



4. Contract and Hold



5. Post baseline

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12). We recommend entering the name of the muscle in the description field.

You can then review the session with the screen **Report-Review 1 Ch Endurance** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

You can also compare the two muscles, or report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16).

ADVANCED PROTOCOLS

These are the advanced protocols (with associated review screens) that can be accessed by clicking the **Quick Start** button.

Category: REHAB – Assessment Protocols

The protocols used with 1 EMG are:

- **R – 04 – 1 Channel EMG Assessment**, with the review screen **1 Ch Assessment**

The protocols used with 2 EMG are:

- **R–- 05 – 2 Channel EMG Assessment**, with the review screen **2 Ch Assessment**

1 CHANNEL EMG ASSESSMENT (FOR ONE MUSCLE)

This is a complete assessment of the muscle with 5 activities: pre baseline, fast flicks (rapid contractions), work/rest, endurance (resistance) and post baseline. This script will help you to detect potential hypo/hyper tonicity (max work, mean rest) or velocity (onset & release time).

Fast flicks (or rapid contractions): the patient repetitively contracts as quickly and strongly as they can. This monitors the recruitment of the fast twitch fibers (muscle strength and velocity). This is done at the beginning of the session, since these fibers are the first to get fatigued.

- **Statistics**: Maximum contraction.

Work/Rest: the patient contracts the muscle to a high but comfortable level, and then relaxes. This is repeated only few times to avoid fatiguing the muscle. This monitors the recruitment of both types of fibers (muscle control).

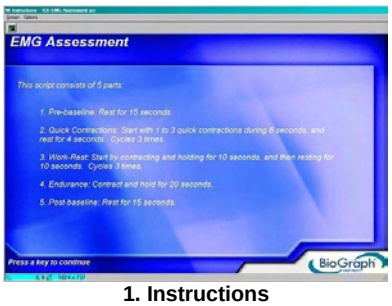
- **Statistics**: Maximum contraction, variability (neuromuscular stability), area (energy) and onset time (muscle activation velocity) during work period, and release time (muscle deactivation velocity), variability (neuromuscular stability) and mean (resting level) during rest period.

Endurance: 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).

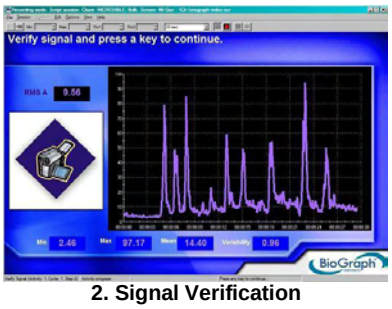
- **Statistics**: Mean (averaged contraction), variability (neuromuscular stability), area (energy).

Baseline (pre/post): The patient must relax. Comparison of resting levels (pre/post) assesses the ability to recover.

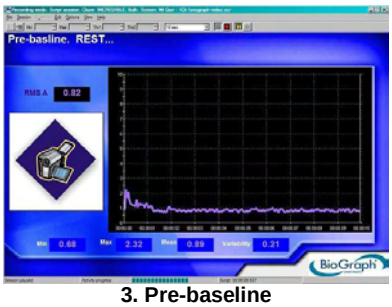
- **Statistics**: Mean and variability (neuromuscular stability).



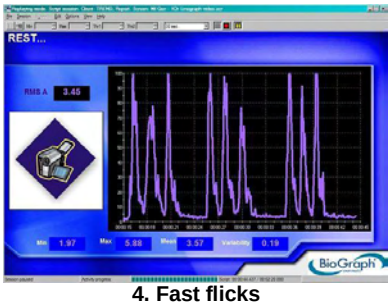
1. Instructions



2. Signal Verification

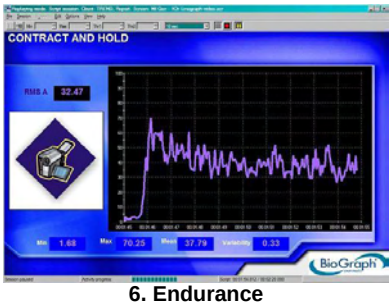


3. Pre-baseline

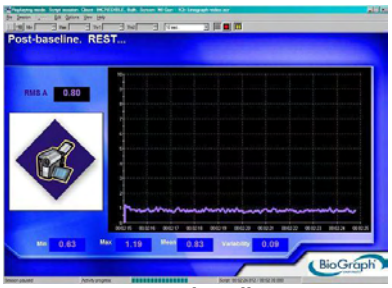


4. Fast flicks

5. Work/Rest



6. Endurance



7. Post baseline

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12). We recommend entering the name of the muscle in the description field.

You can then review the session with the screen **Report-Review 1 Ch Assessment** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16).

2 CHANNEL EMG ASSESSMENT (FOR TWO MUSCLES)

This protocol can be used to compare agonist and antagonist muscles, or measure a bilateral difference.

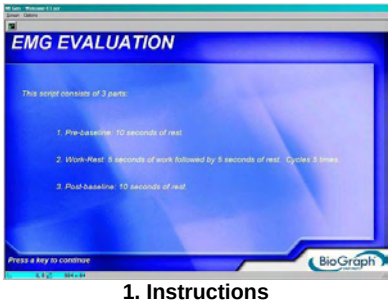
It consists of a series of contractions and relaxations (Work/Rest) where percentage of difference is computed. The percentage of difference has to be used carefully. This measurement is only relevant when there is no (or very little) activation/deactivation delay between the muscles, or if they are in opposite phase (agonist vs. antagonist). This measure is not very relevant to compare the agonist with its synergist. This protocol also displays the EMG signal of both muscles on the same line graph, so you can verify the timing.

- **Statistics**: Maximum %. For bilateral difference, maximum % should be minimized. For agonist/antagonist, maximum % should be maximized.

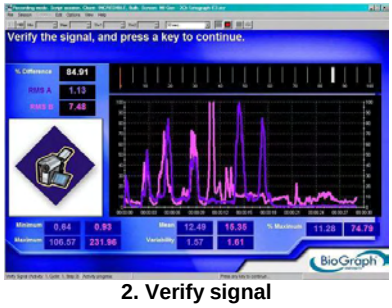
  Maximum % is referred to maximal force or MVC. First you must set the value in virtual channel V23 (*A: EMG as % of value*). To edit V23, select **Edit** in the menu, on top of the screen. Then click on **Edit Virtual Channel Settings**, select V23 and edit *Input 2 Constant Value*.

The script is divided into 3 steps:

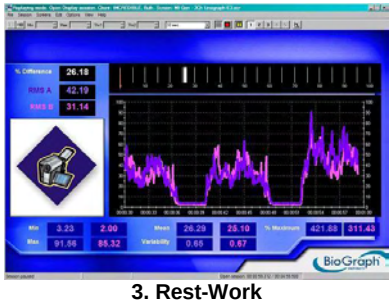
1. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done.
2. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
3. **Rest-work cycle:** The patient performs the movement (Work phase) for 5 seconds, five times. You can modify the timing if it is not suitable for the movement (see *Changing Script Settings*, page 17).



1. Instructions



2. Verify signal



3. Rest-Work

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12). We recommend entering the names of the involved muscles in the description field.

You can then review the session with the screen **Report-Review 2 Ch Assessment** in the category **Report-Review**, and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16).

SPECIALIZED PROTOCOLS

SEMG is widely used in the evaluation of low back pain, patellofemoral pain and unstable shoulder. To learn more about these, please read your clinical guide, installed on your computer with the other documents (click on the **BioGraph Infiniti Docs & Editors** icon on your desktop).

These are the specialized protocols (with associated review screens) that can be accessed by clicking the **Quick Start** button.

Category: REHAB – Assessment Protocols

The protocols used with 2 EMG are:

- **R – 06 – Low Back Pain Evaluation**, with the review screen **2 Ch Assessment**
- **R – 07 – Patellofemoral Pain Evaluation**, with the review screen **2 Ch Assessment**
- **R – 08 – Unstable Shoulder Evaluation**, with the review screen **2 Ch Assessment**

LOW BACK PAIN EVALUATION

This script allows you to assess low back pain.

The script is divided into 5 steps:

1. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done.
2. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
3. **Pre-baseline:** The patient must stand straight and relax, ready to start the movement.
4. **Rest-work cycle:** The patient performs the bending within 10 seconds when prompted to "Work", and then stands up when prompted to "Rest". The exercise is repeated three times. You can modify the timing if it is not suitable for the movement (see *Changing Script Settings*, page 17).
5. **Post-baseline:** The patient must stand straight and relax.

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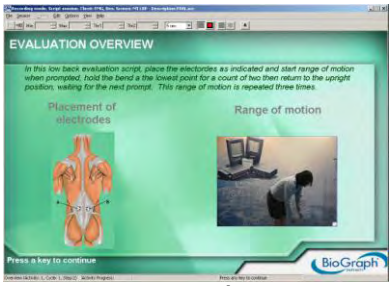
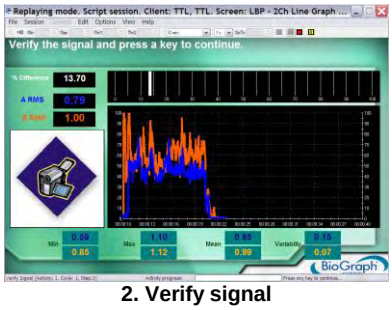
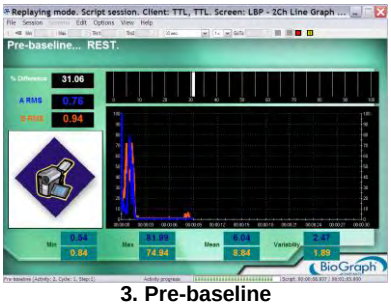


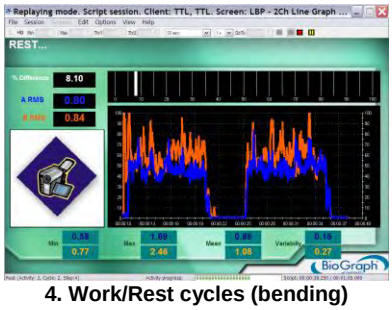
1. Instructions



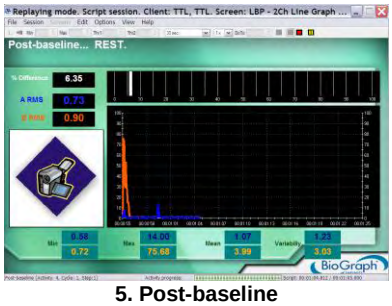
2. Verify signal



3. Pre-baseline



4. Work/Rest cycles (bending)



5. Post-baseline

Explanation of the statistics:

- **Mean** of pre/post baseline: resting values should be below 5µV. Comparison of resting levels (pre/post) assesses the ability to recover.
- **Mean** during Work/Rest should be within 35% of each other through a series of ranges of motion.
- **Maximum** during Work/Rest should be within 35% of each other, if the range of motion was controlled and straight.
- **Minimum** during Work/Rest should be below 5µV.

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12).

You can then review the session with the screen **Report-Review 2 Ch Assessment** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16).

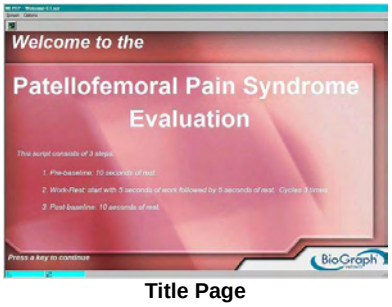
PATELLOFEMORAL PAIN EVALUATION

This script allows you to assess patellofemoral pain.

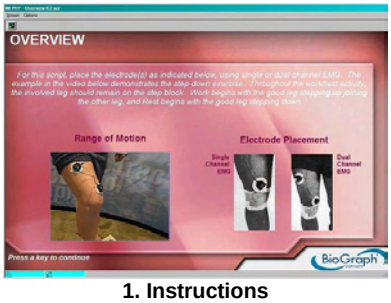
The script is divided into 5 steps:

1. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done.
2. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.

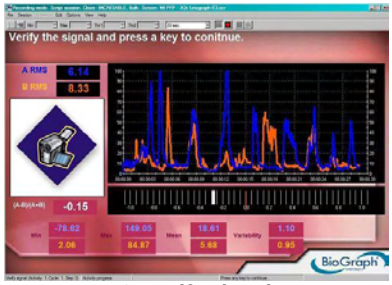
3. **Pre-baseline:** The patient must remain relaxed with the involved leg on the step block and the other leg down, and must be ready to start the movement (good leg down).
4. **Rest-work cycle:** The patient steps up within 5 seconds when prompted to "Work", and steps down when prompted to "Rest". The exercise is repeated three times. You can modify the timing if it is not suitable for the movement (see *Changing Script Settings*, page 17).
5. **Post-baseline:** The patient must remain relaxed, with the involved leg on the step block and the other leg down.



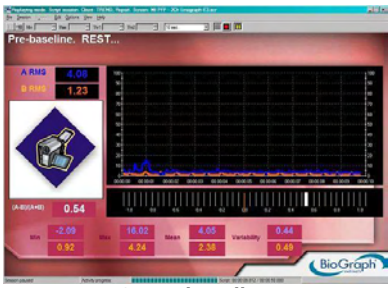
Title Page



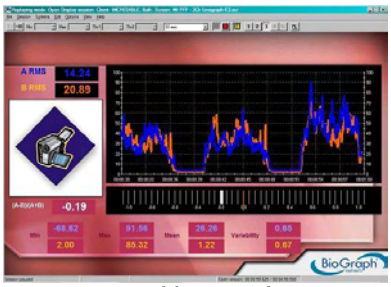
1. Instructions

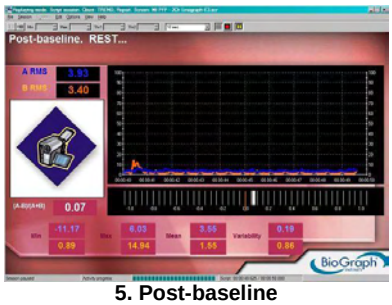


2. Verify signal



3. Pre-baseline


4. Work/Rest cycles (step up/down)



5. Post-baseline

Explanation of the statistics:

- **Mean** of pre/post baseline: resting values should be below 5µV. Comparison of resting levels (pre/post) assesses the ability to recover.
- **Mean** of VMO/VL ratio during Work/Rest should be greater than 1, ideally around 2.

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12).

You can then review the session with the screen **Report-Review 2 Ch Assessment** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

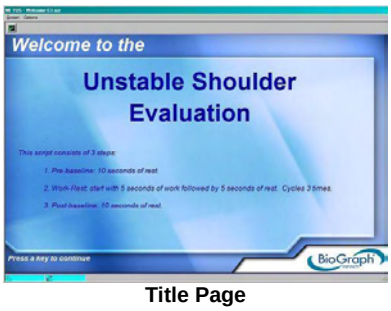
You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16).

UNSTABLE SHOULDER EVALUATION

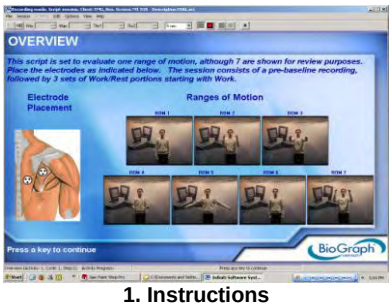
This script allows you to assess shoulder instability.

The script is divided into 5 steps:

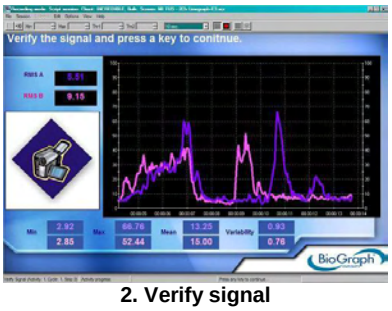
1. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done. Videos show the 7 different movements.
2. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
3. **Pre-baseline:** The patient must keep the shoulders relaxed.
4. **Rest-work cycle:** The patient performs the movement within 5 seconds when prompted to "Work", and comes back to the initial state while maintaining the shoulder blade pinched when prompted to "Rest". The exercise is repeated three times. The movements are described in your clinical guide. You can modify the timing if it is not suitable for the movement (see *Changing Script Settings*, page 17).
5. **Post-baseline:** The patient must keep the shoulders relaxed.



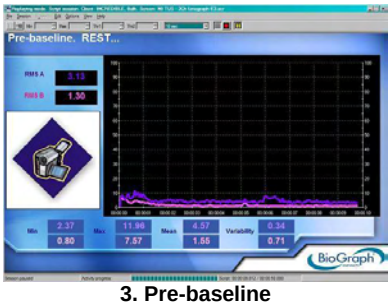
Title Page



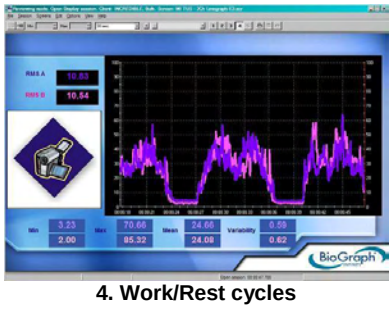
1. Instructions



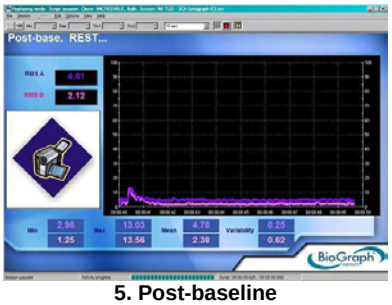
2. Verify signal



3. Pre-baseline



4. Work/Rest cycles



5. Post-baseline

Explanation of the statistics:

- **Mean** of pre/post baseline: resting values should be below 5µV. Comparison of resting levels (pre/post) assesses the ability to recover.
- **Maximum** of Work in **Range of Motion 1 Tightening of Rotator Cuff** will be used as a threshold reference for the next exercises.
- **Mean** of Work/Rest is used to validate the success of the patient in performing the exercise.

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12). We recommend entering the name of the exercise in the description field.

You can then review the session with the screen **Report-Review 2 Ch Assessment** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16).

TRAINING PROTOCOLS

This section suggests several training protocols for your rehabilitation program. For each protocol, a series of training screens are recommended.

ISOLATION OF TARGET MUSCLE ACTIVITY

The goal of this training protocol is to teach the patient how to activate the target muscle without co-activating the neighboring muscles or the contra lateral homologous muscles (for instance, contracting the lower trapezius without co-activating the upper trapezius).

Connect the target muscle on channel A, and the other muscle on channel B. The screens recommended for this technique are:

- **Equilibration - 2Ch Bi-Lateral Bar-Video 2** in *Category: Equilibration* (page 38). Equilibration refers to bringing muscles into equilibrium.
- **Training - 2Ch Line Graph – Grow Box** and **Training - 2Ch Filled Line Graphs** in *Category: Training* (page 39).

THRESHOLD-BASED RELAXATION TRAINING

The goal of this training technique is to teach the patient how to relax hyperactive muscles.

The threshold should be set at about 20%, or a few microvolts below the baseline. The patient should deactivate the muscle until they reach the threshold.

When the threshold is achieved, progression should be made to more challenging values until a normal resting baseline is achieved (below 5 microvolts).

The most suitable training screens for this technique are in *Category: Relaxation* (page 31).

THRESHOLD-BASED STRENGTHENING

This technique is used to train the patient to increase the activation of a weak or hypoactive muscle.

The threshold should be set at about 20%, or a few microvolts above the maximum contraction. The patient should activate the muscle until he reaches the threshold.

When the threshold is achieved, progression should be made to more challenging values. If published standards of muscle activity are not available, compare the muscle with the uninvolved side (maximal force).

The most suitable training screens for this technique are in *Category: Strengthening* (page 33).

TENSION RECOGNITION

When the patient presents a focally elevated muscle activity with poor subjective recognition of tension sensations, training should be designed to facilitate kinesthetic awareness of tension at an initial change from the baseline level.

The threshold should be set at a small value above the resting baseline. The patient should activate the muscle until they reach the threshold and maintain this activity for a few seconds. The patient should pay attention to internal sensations related to joint position and tension. When the patient has a good control of this technique they should try to tense the muscle to the same value they have been practicing without looking at the SEMG feedback. If the patient achieves a good result then the threshold value should be lowered, and all the procedure should be repeated.

The most suitable training screens for this technique are in *Category: Strengthening* (page 33).

TENSION DISCRIMINATION TRAINING

This technique is similar to the previous one, except that multiple goal criteria are used and at higher amplitude values. The intention is that patients internalize the microvolt scale as they pay attention to the intrinsic kinesthetic feedback. This exercise acts as a precursor to dynamic coordination training.

When starting this exercise, the threshold should be set at 10% of the maximum recruitment ability (or maximal force). The patient should hold the contraction for about ten seconds and then rest for about 15 seconds. This should be trained several times (10) until the patient has the ability to match the goal in a consistent manner. Then the threshold should be set at 50 to 75% of the initial threshold, and 10 more trials should be trained.

Then the series should be repeated at smaller values, until 3 to 5 goal points have been trained. The next step is to reproduce each goal level in consecutive 5-second steps without resting periods. Then the order should be reversed so that SEMG activity “ramps” down. In the next step the thresholds should be set in random order. In the final step the patient should train to activate to a specific threshold without having external feedback.

The most suitable training screens for this technique are **Control – 1Ch Tension Discimination Training Level 1, 2 and 3**, in *Category: Control* (page 37). **Control – 1Ch Tubes** can also be used. In this case, adjust the animation scale on the left rather than the threshold and ask the patient to reach a given color.

BILATERAL EQUILIBRATION TRAINING

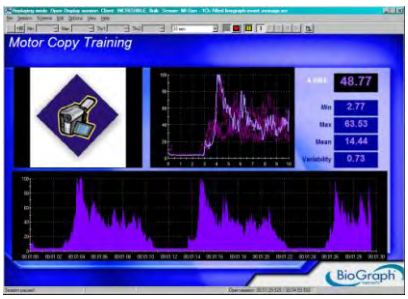
When homologous muscles act differently during symmetric movement, equilibration training should be performed. (Equilibration refers to bringing the muscles back into equilibrium.)

The fastest way to achieve this is to uptrain the muscle that apparently displays hypo-activity. Several authors have noticed that high side activity spontaneously decreases as low side activity is uptrained. Note that the patient should be able to correctly perform the previous 6 training exercises before being trained in this technique. The most suitable training screens for this technique are in *Category: Equilibration* (page 38).

MOTOR COPY TRAINING

The purpose of this procedure is to train the muscle coordination of the involved side by matching the SEMG pattern of the uninvolved side. The most suitable training screens for this technique are in *Category: Equilibration* (page 38) and in *Category: Training* (page 39).

The screen **Training – 1Ch Motor Copy Training** (see page 40) can also be used as follows:



Before starting the session:

1. Place the electrodes on both sites (involved and uninvolved sides) and connect the two cables to the electrodes, but not to the device.
2. Then connect the uninvolved side to channel A.
3. Start the session and ask the patient to perform the movement on the healthy side. The contraction will be plotted on the top line graph and will be used as a template.
4. Press the **Pause** button

.
5. Disconnect the cable and connect the involved side.
6. Press the **Pause** button again to continue the session. Ask the patient to reproduce the movement on the unhealthy side.

PROMOTION OF CORRECT MUSCLES SYNERGIES AND RELATED COORDINATION PATTERNS

This procedure should be used when the relationship of different muscles in the execution of a specific task is altered. If published standards of muscle activity are not available, compare with the uninvolved side.

Connect the agonist on channel A and either one of the following:

- Connect the antagonist on channel B.
- Connect the synergist on channel B.

The most suitable training screens for this technique are in *Category: Training* (page 39).

The thresholds are used to activate/deactivate the sound feedback.

POSTURAL TRAINING

The goal of this technique is to reinforce good posture. The patient should be trained first with visual and/or audio feedback and then without. Training screens with immediate feedback are recommended. The most suitable training screens for this technique are in *Category: Equilibration* (page 38) and in *Category: Training* (page 39).

SELECTION OF THERAPEUTIC EXERCISES

The use of SEMG can be very helpful in selecting specific exercises and instructing the patient on how to do them. SEMG can be used to evaluate the usefulness of a specific exercise and the intensity it should be done at. Training screens that plot the actual signal in a line graph and display real-time statistics, such as those in *Category: Training* (page 39), are recommended.

TRAINING SCREENS

These screens are designed to be used with one or several training protocols. They have various displays and audio/visual feedbacks. You can select up to 5 screens for the same sessions (see *Open Display Session*, page 11 and *Toggling between Screens*, page 17). This allows you to change your training goal or technique on the fly.

You can adapt screens to your patient and training goal by changing the scale and thresholds (when not automatic). Read *Adjusting Scales and Threshold*, page 17, for more information.

Within each training category, selected training screens have been grouped with appropriate review screens to create one or more predefined session configurations called **Favorites**. The purpose of these groupings to to provide well-balanced training sessions, starting with the easiest exercises and progressing to the more challenging ones. Favorites are accessed by clicking the Quick Start button.

For more information about Favorites, read the section *Starting a session from a Favorite* on page 8.

CATEGORY: RELAXATION

Screens in this category are designed for muscle deactivation training and ultimately total relaxation.

These screen groupings (with associated review screens) can be accessed by clicking the **Quick Start** button.

Category: REHAB – Relaxation Training

Group Name: R - RELAX01 - Relaxation with 1 EMG

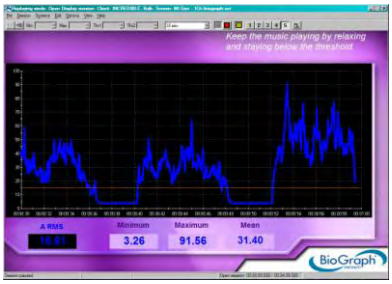
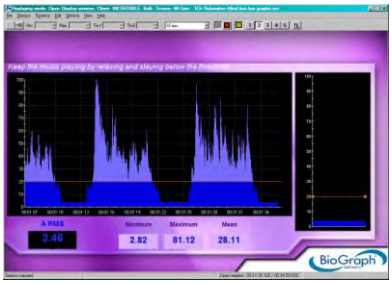
- **Relaxation – 1Ch Line Graph**
- **Relaxation – 1Ch Relaxation Bar Graph**
- **Relaxation – 1Ch Smiley**
- **Relaxation – 1Ch Knee Flexion**
- **Relaxation – 1Ch Wrist Flexion**
- With the review screen **1Ch Open Display**

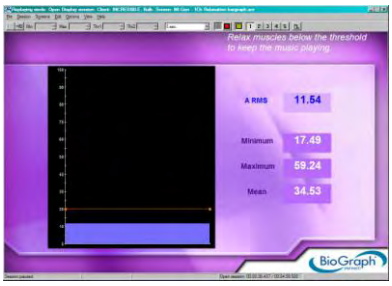
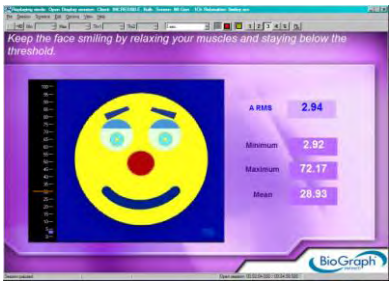
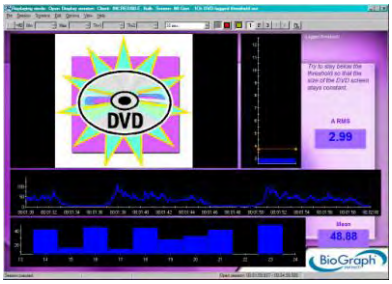
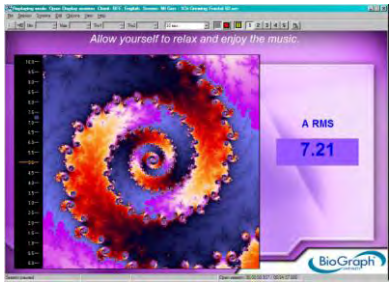
Group Name: R - RELAX02 - Relaxation with 1 EMG

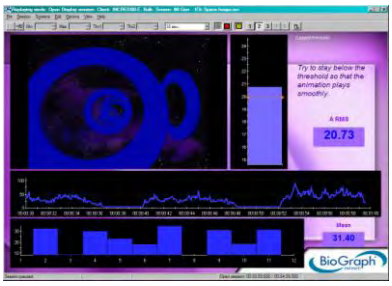
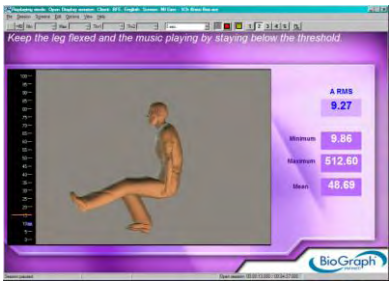
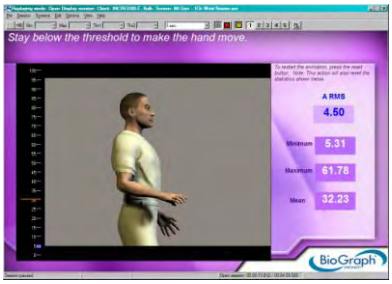
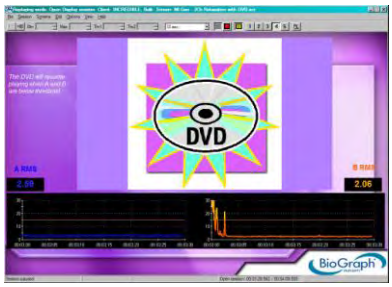
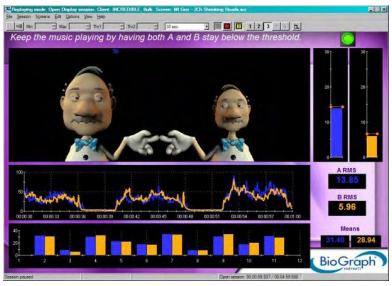
- **Relaxation – 1Ch Filled Line-Bar Graphs**
- **Relaxation – 1Ch Parrot Puzzle**
- **Relaxation – 1Ch Growing Fractal**
- **Relaxation – 1Ch Space Hoops**
- **Relaxation – 1Ch DVD**
- With the review screen **1Ch Open Display**

Group Name: R - RELAX03 - Relaxation with 2 EMG

- **Relaxation – 2Ch Relaxation with DVD**
- **Relaxation – 2Ch Shrinking Heads**
- With the review screen **2Ch Open Display**

Relaxation - 1Ch Line Graph Music is played when the channel A signal stays below the threshold.	
Relaxation - 1Ch Filled Line-Bar Graphs 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 - 1Ch Relaxation Bar Graph Music is played when the channel A signal stays below the threshold.	
Relaxation - 1Ch Smiley The face will smile when the channel A signal is below the threshold.	
Relaxation - 1Ch DVD The channel A signal must stay below the threshold to keep the DVD screen size constant.	
Relaxation - 1Ch Growing Fractal 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 - 1 Ch Parrot Puzzle Single channel puzzle screen. 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 start to disappear.	

Relaxation - 1Ch Space Hoops The animation moves when the channel A signal is below the threshold.	
Relaxation - 1Ch Knee Flexion The animation is controlled by the signal and the threshold. When the signal is below the threshold, the leg relaxes; when above, it straightens. Adjust the threshold by moving the orange line up or down.	
Relaxation - 1Ch Wrist Flexion The animation is controlled by the signal and the threshold. When the signal is below the threshold, the wrist relaxes; when above, it straightens. Adjust the threshold by moving the orange line up or down.	
Relaxation - 2Ch Relaxation with DVD The DVD will resume playing when both channels A and B are below the threshold.	
Relaxation - 2Ch Shrinking Heads Music is played when both channels A and B (bar graphs on the right) are below the threshold. The two heads must be 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.	

CATEGORY: 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.

These screen groupings (with associated review screens) can be accessed by clicking the **Quick Start** button.

Category: REHAB – Strengthening Training

Group Name: R - STRN01 - Strengthening with 1 EMG

- **Strengthening – 1Ch Bar Graph**
- **Strengthening – 1Ch Filled Line Graph**
- **Strengthening – 1Ch Filled Line-Bar Graphs**
- **Strengthening – 1Ch Smiley**
- With the review screen **1Ch Open Display**

Group Name: R - STRN02 - Strengthening with 1 EMG

- **Strengthening – 1Ch Filled Line Graph**
- **Strengthening – 1Ch Smiley**
- **Strengthening – 1Ch Rooster Puzzle**
- **Strengthening – 1Ch Flower Puzzle**
- **Strengthening – 1Ch Dolphin Puzzle**
- With the review screen **1Ch Open Display**

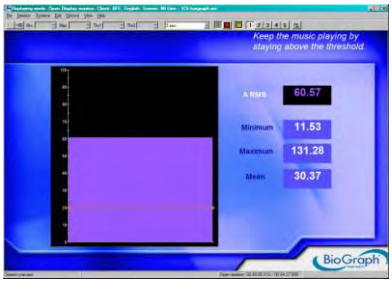
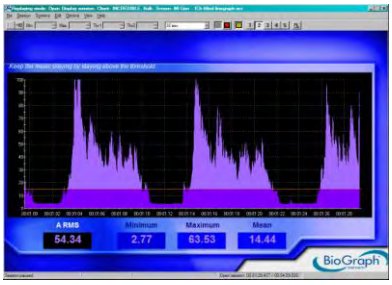
Group Name: R - STRN03 - Strengthening with 2 EMG

- **Strengthening – 2Ch Tomato Puzzle.**
- **Strengthening – 2Ch Hero Morph-Slow**
- **Strengthening – 2Ch Car Race**
- **Strengthening – 2Ch Conditional DVD**
- With the review screen **2Ch Open Display**

Group Name: R - STRN04 - Strengthening with 2 EMG

- **Strengthening – 2Ch Knee Flexion**
- **Strengthening – 2Ch Wrist Flexion**
- With the review screen **2Ch Open Display**

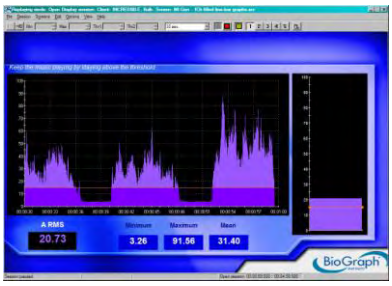
The three first screens show a classic view of the signal with bar graphs and line graphs.

Strengthening - 1Ch Bar Graph 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 The signal changes color, and bolero music plays, when channel A goes above the threshold.	

Strengthening - 1Ch Filled Line-Bar Graphs

The signal changes color, and music plays, when channel A goes above the line graph threshold.

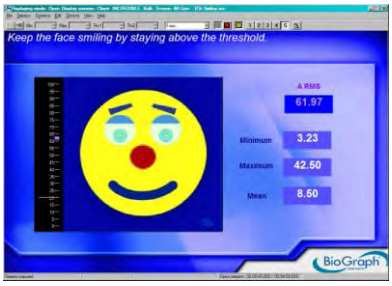
The bar graph also displays the EMG levels in real time.



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

Strengthening - 1Ch Smiley

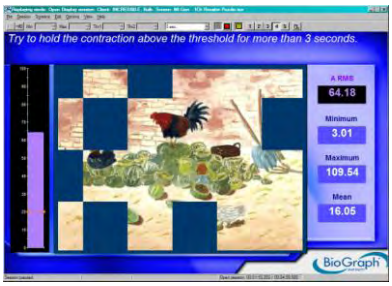
The face will continue smiling as long as the contraction on channel A is being held above threshold.



Strengthening - 1Ch Rooster Puzzle

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.

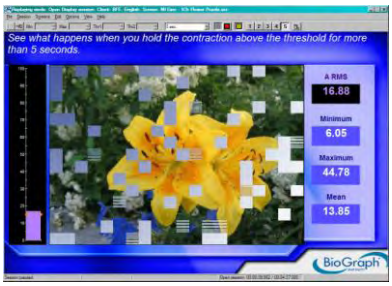
The threshold is also indicated by the Tarantella tune and can be set on the bar graph instrument.



Strengthening - 1Ch Flower Puzzle

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.

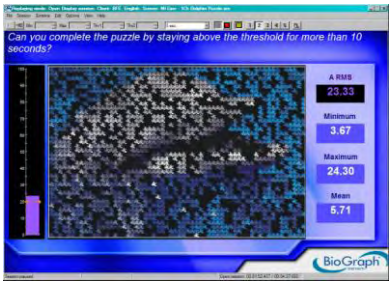
The threshold is also indicated by a jazz tune and set on the bar graph.



Strengthening - 1Ch Dolphin Puzzle

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.

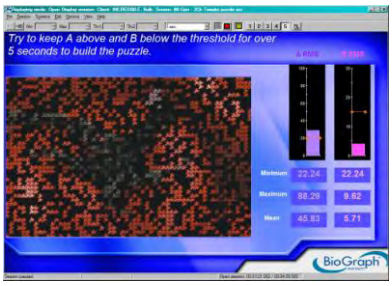


The four next screens are more challenging, involving two muscles. Channel A is used for the muscle that must be activated, while channel B is used for the muscle that must not be activated.

Strengthening - 2Ch Tomato Puzzle

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.



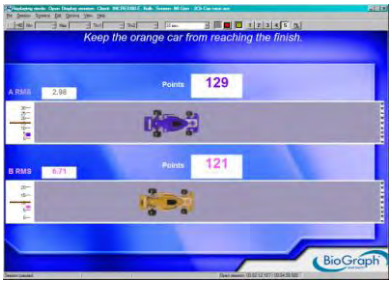
Strengthening - 2Ch Hero Morph-Slow

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

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.



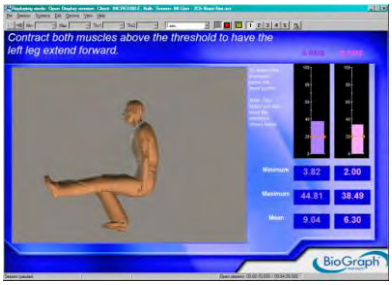
Strengthening - 2Ch Conditional DVD

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.

The two next screens are specific to a given joint.

Strengthening - 2Ch Knee Flexion

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 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: 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.

These screen groupings (with associated review screens) can be accessed by clicking the **Quick Start** button.

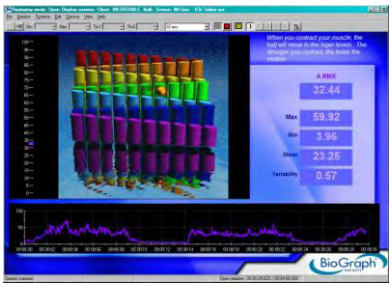
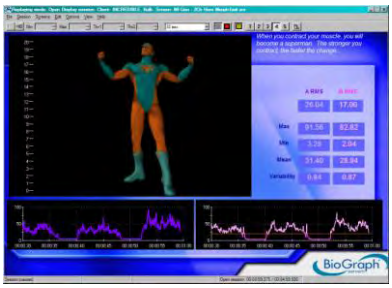
Category: REHAB – Control Training

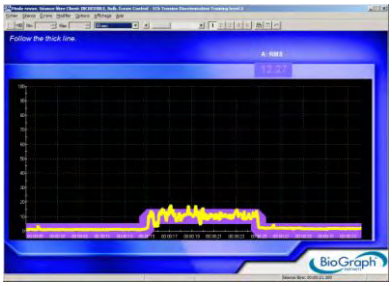
Group Name: R - CTRL01 - Control with 1 EMG

- **Control – 1Ch Tubes**
- **Control – 1Ch Tension Discrimination Training Level 1,2 and 3**
- With the review screen **1Ch Open Display**

Group Name: R - CTRL02 - Control with 2 EMG

- **Control – 2Ch Hero Morph-Fast**
- **Control – 2Ch Animal Game**
- With the review screen **2Ch Open Display**

Control - 1Ch Tubes 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 place the ball to a given tube color.	
Control - 2Ch Hero Morph-Fast 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 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.	
Control - 1Ch Tension Discrimination Training Level 1, 2 and 3 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.	

CATEGORY: EQUILIBRATION

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

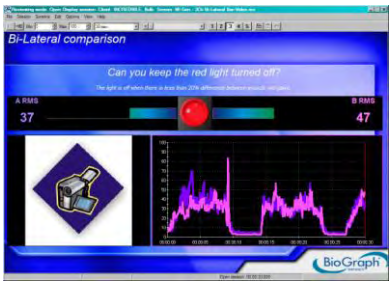
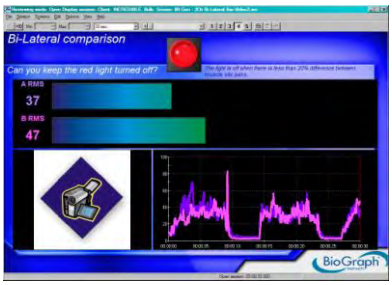
These screen groupings (with associated review screens) can be accessed by clicking the **Quick Start** button.

Category: REHAB – Equilibration Training

Group Name: R - EQUL01 – Equilibration with 2 EMG

- **Equilibration – 2Ch Balance Ratio**
- **Equilibration – 2Ch Gorilla Ratio**
- **Equilibration – 2Ch Bi-Lateral Bar-Video**
- **Equilibration – 2Ch Bi-Lateral Bar-Video 2**
- With the review screen **2Ch Open Display**

Equilibration - 2Ch Balance Ratio 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.	
Equilibration - 2Ch Gorilla Ratio 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.	

Equilibration - 2Ch Bi-Lateral Bar-Video 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 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.	

CATEGORY: TRAINING

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

These screen groupings (with associated review screens) can be accessed by clicking the **Quick Start** button.

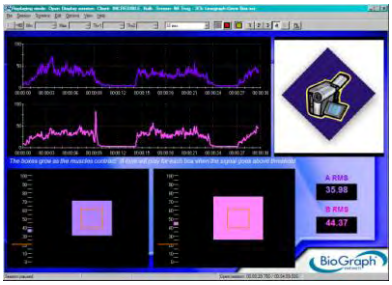
Category: REHAB – Training

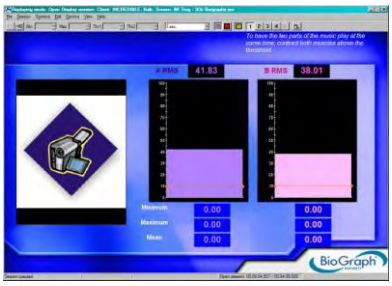
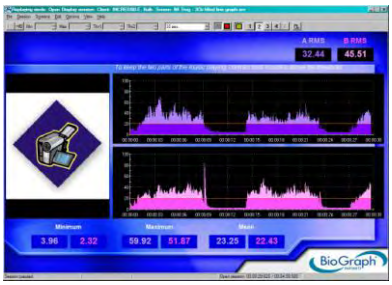
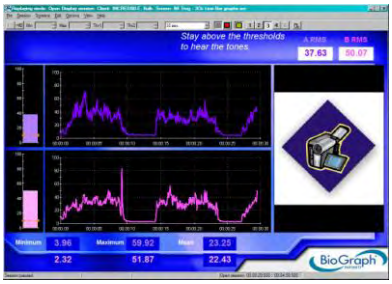
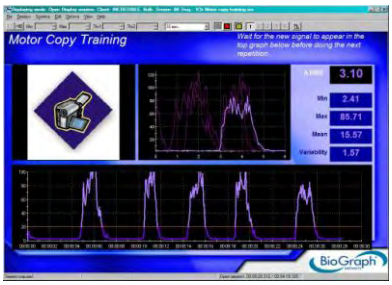
Group Name: R - TRNG01 - Training with 2 EMG

- **Training – 2Ch Line Graph – Grow Box**
- **Training – 2Ch Bar Graphs**
- **Training – 2Ch Filled Line Graphs**
- **Training – 2Ch Line-Bar Graphs**
- With the review screen **2Ch Open Display**

Group Name: R - TRNG02 - Training with 1 EMG

- **Training – 1Ch Motor Copy Training.**
- With the review screen **1Ch Open Display**

Training - 2Ch Line Graph – Grow Box 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 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 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 Both channels are displayed on a line graph and a bar graph.	
Training – 1Ch Motor Copy Training 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 Virtual Channel Settings**, select V210 and edit the **Input 2 Constant Value**.	

REVIEW AND REPORT

You can then review the session with the screen **Report-Review 1 Ch Open Display** for 1 channel or with the screen **Report-Review 2 Ch Open Display** for two channels in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

Treatment of Incontinence

Most incontinence problems can be improved by biofeedback. Its role in controlling urinary and fecal incontinence is widely recognized and well-established. Patients can acquire more control over their pelvic floor muscle through strengthening exercises, reducing excessive muscle activity or using the muscles appropriately.

Two types of protocols are presented:

- Assessment protocols
- Training protocols (such as templates, strengthening or relaxation)

The assessment protocols will help you to evaluate the condition of your patient, before, during and after the treatment, and will allow you to generate session reports (see Generating Session Reports, page 15) or trend reports (see Generating Trend Reports, page 16).

The protocols can be in the form of open display screens (free sessions) or scripts (directed sessions), as described in the Quick Start section (in the sub-section Recording Sessions, page 8).

All the assessments are scripts. Most of the training protocols are open display screens; some of them are scripts.

ATTACHING ELECTRODES– PREPARATION FOR TREATMENT

CHANNEL A FOR PELVIC MUSCLES

Channel A is dedicated to monitoring the pelvic muscles and requires the use of a vaginal or rectal sensor.

Connect the sensor to the input A of the device (see *Setting Up the MyoTrac3™ System*, page 3).

Place the reference electrode (black connector) anywhere on the body (thigh or abdomen, for instance).

CHANNEL B FOR ABDOMINAL MUSCLES

Channel B is dedicated to monitoring the abdominal muscles.

It requires the use of EMG surface electrodes and the extender cable.

The blue (positive) and yellow (negative) connectors are for the active electrodes, the black one is for the reference.

Before applying electrodes, make sure the skin surface is clean and dry.

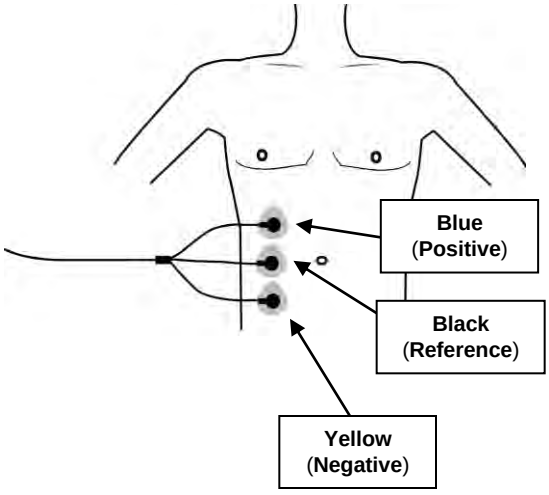
Connect the EMG electrodes to the extender cable, using the adaptors, and the cable to input B of the device (see *Setting Up the MyoTrac3™ System*, page 3).

Then place the electrodes on the muscle as illustrated.

Place the reference electrode (black connector) anywhere on the body, between the active electrodes (yellow and blue connectors) for instance, as shown on the picture.

Make sure the electrodes are placed firmly on the skin, and make good contact between the skin and electrodes.

It is recommended to put conductive electrode paste or cream on the EMG electrodes (grey area only) before applying them to the skin.



QUICK ASSESSMENT PROTOCOLS (SCRIPTS)

These protocols can be performed at the beginning of each visit. They allow you to quickly assess the patient's condition and get the training parameters of the day (since a patient's condition can change over time).

> These are the quick assessment protocols (with associated review screens) that can be accessed by clicking the **Quick Start** button.
>
> **Category: CONTINENCE – Assessment Protocols**
>
> ***The protocols used with 2 EMG are:***
>
> - **C – 01 – Baseline,** with the review screen **2 Ch Baseline**.
> - **C – 02 – Maximal Force,** with the review screen **2 Ch Maximal Force**.

BASELINE

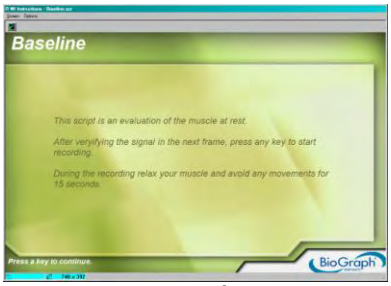
This protocol measures the resting level of the pelvic floor. The patient must be asked to totally relax the muscle.

This protocol calculates two statistics: variability and mean.

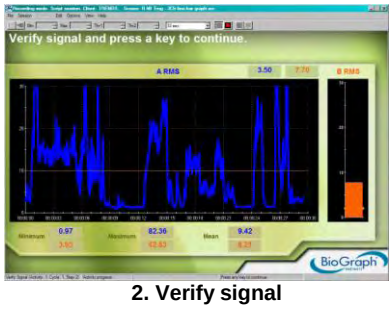
- **Variability** measures the neuromuscular stability. The lower the variability, the more stable the muscle. Since there is no standard value that the variability can be compared to, it is recommended to measure the healthy side and compare both results.
- **Mean** is the average of the resting level throughout the session. This value will help you to detect potential hyper-activity. A healthy muscle should be able to go below 5µV.

The script is divided into 3 steps:

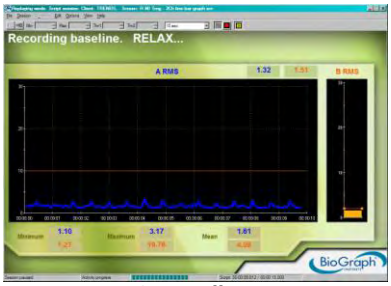
1. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done.
2. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
3. **Baseline:** Relax muscles to determine new resting levels; duration is 15 seconds.



1. Instructions



2. Verify signal



3. Baseline

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12). We recommend entering the name of the muscle in the description field.

You can then review the session with the screen **Report-Review - 2Ch Baseline** in the category **Report-Review**, and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16). These protocols can be performed at the beginning of each visit. They allow you to quickly assess the patient's condition and get the training parameters of the day (since a patient's condition can change over time).

MAXIMAL FORCE

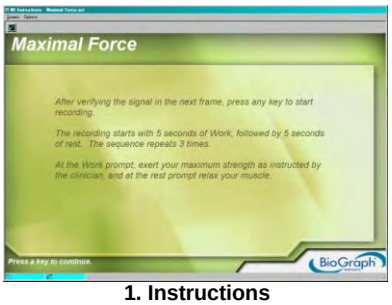
This protocol measures the maximal force. The maximal force is the highest level of voluntary contraction that a person can achieve without inducing unacceptable pain.

This protocol calculates four statistics: variability, mean, maximum and area under the curve.

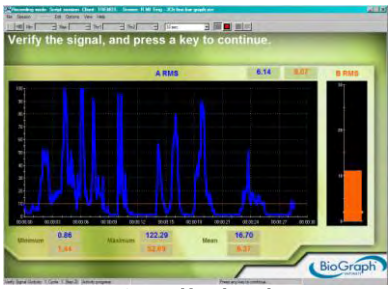
- **Variability** measures the neuromuscular stability. The lower the variability, the more stable the muscle.
- The **Maximum** is the average of the maxima of all contractions.
- The **Mean** is the average of the means of all contractions.
- **Area under the Curve** during work period indicates the level of energy produced by the contraction.

The script is divided into 3 steps:

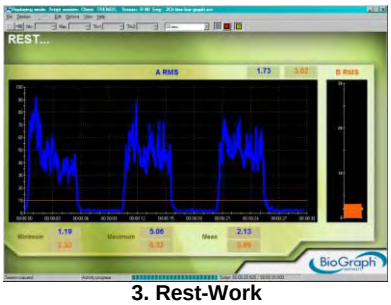
1. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done.
2. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
3. **Rest-work cycle:** The patient relaxes and contracts muscles for 5 seconds, three times.



1. Instructions



2. Verify signal



3. Rest-Work

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12). We recommend entering the name of the muscle in the description field.

You can then review the session with the screen **Report-Review 2 Ch Maximal Force** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16).

PELVIC MUSCLE DYSFUNCTION ASSESSMENT (SCRIPT)

There are many types of biofeedback assessments for the pelvic muscles; these are typically dependent upon the type of incontinence and/or muscle dysfunction that the patient presents. The assessment script included within the Suite is **PMD Assessment 5 Activities** that can be found in the script category **Assessment**. This is a basic assessment protocol that allows the clinician an objective measurement of pelvic muscle function and progress.

> This is the PMD assessment protocol (with associated review screen) that can be accessed by clicking the **Quick Start** button.
>
> **Category: CONTINENCE – Assessment Protocols**
>
> - **C – 03 – PMD ASSESSMENT 5 ACTIVITIES,** with the review screen **2 Ch PMD Assessment 5 Activities**.

The results are a set of statistics that can be trended across sessions to reflect a patient's progress and can help determine the type of exercise and/or practice that is needed by that particular patient.

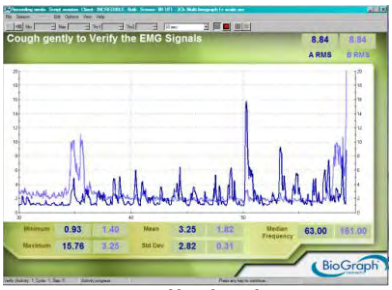
The 5-activity assessment looks at the *Resting Level* of the pelvic muscles before and after a series of exercises. The purpose is to determine the statistical mean of the resting levels of both channels A and B. The assessment also includes exercises for **Quick Contractions**, **Contract & Hold** and **Endurance**. Each type of exercise results in a different outcome which is then utilized to determine what type of exercise is needed for that day's session and how to best individualize the various open display screens for that patient. Note that channel B is dedicated to the monitoring of the abdominal muscles, which must remain relaxed when the pelvic muscles (channel A) are contracted.

For instance, the resting level mean obviously is used as a guide for establishing the threshold value for *Relaxation-oriented* open display screen exercises. During the **Quick Contraction** exercise, the maximum value represents a

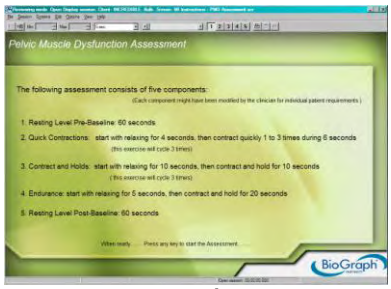
value that would be appropriate for setting the y-axis maximum scales on either the animation or graph displays. **Contract & Hold** exercises result in a mean value for both the work cycle and rest cycle that can then help to calculate the 40% upper threshold setting on *Strengthening-oriented* open display screens. Finally, the mean value on channel A from the **Endurance** exercises can provide you with a sub-maximal threshold value.

As mentioned, the script is divided into 5 activities:

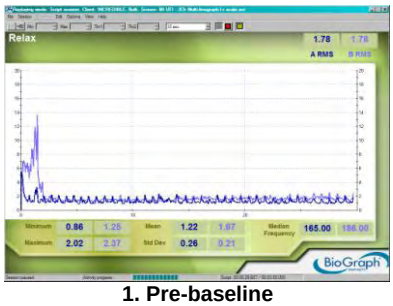
1. **Pre-baseline**; Divided into 3 steps:
    a. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next step.
    b. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done.
    c. **Pre-baseline:** Relax muscles to determine initial resting level. Duration is 60 seconds.
    - Statistics calculated: mean for both channels.
2. **Quick contractions**; Divided into 2 steps and repeats 3 times:
    a. **Relax:** Duration is 4 seconds.
    - Statistics calculated: mean for both channels.
    b. **Quick contractions:** Contract quickly 1 to 3 times during 6 seconds.
    - Statistics calculated: max for A, mean for both channels.
3. **Contract and hold**; Divided into 2 steps and repeats 3 times:
    a. **Relax:** Duration is 10 seconds.
    b. **Contract and hold:** Maintain contraction for 10 seconds.
    - Statistics calculated: mean for both channels; maximum, onset (rise) & release (fall) times for A.
4. **Endurance**; Divided into 2 steps:
    a. **Relax:** Duration is 5 seconds
    b. **Contract and hold:** Maintain contraction for 20 seconds.
    - Statistics calculated: mean for both channels.
5. **Post Baseline:** Relax muscles to determine new resting levels; duration is 60 seconds.
    - Statistics calculated: mean for both channels.



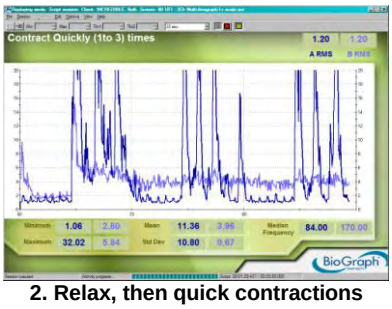
Verify signal



Instructions



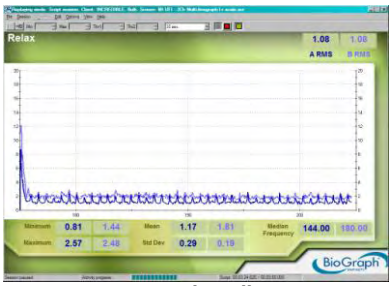
1. Pre-baseline



2. Relax, then quick contractions

3. Relax, then contract and hold

4. Relax, then sustain contraction



5. Post baseline

This sample script was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12).

You can then review the session with the screen **2Ch Report Review PMD Assessment 5 Activities** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 16).

PELVIC MUSCLE TRAINING (SCRIPT)

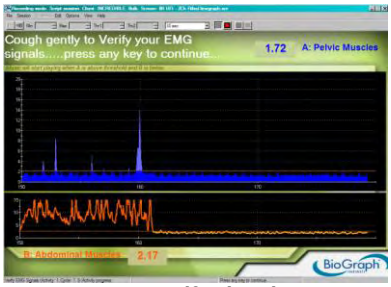
The script is called **PMD 10-10sec 10 cycles** and can be found in the script category **Pelvic Muscle Training**.

> This is the PM training protocol (with associated review screen) that can be accessed by clicking the **Quick Start** button.
>
> **Category: CONTINENCE – Pelvic Muscle TrainingProtocols**
>
> - **C – 04 – PMD 10-10 sec 10 Cycles,** with the review screen **2 Ch PMD 10-10sec 10 cycles**

The script is divided into 3 activities:

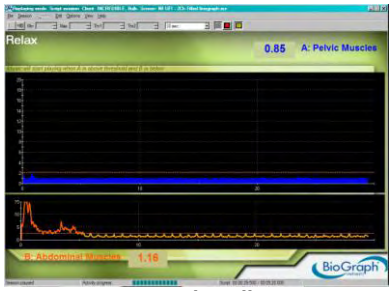
1. **Pre-baseline**; divided into 3 steps:
   a. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
   b. **Read instructions:** Gives you an overview of what to expect; no data is recorded; press any key when you are done.
   c. **Pre-baseline:** Relax muscles to determine initial resting level. Duration is 60 seconds.
2. **Rest-work cycle:** Divided into 2 steps and repeated 10 times:
   a. **Rest:** Relax muscles for 10 seconds.
   b. **Work:** Contract and hold for 10 seconds.
3. **Post baseline:** Relax muscles to determine new resting levels; duration is 60 seconds.

Note that channel B is dedicated to the monitoring of the abdominal muscles, which have to remain relaxed when the pelvic muscles (channel A) are contracted.

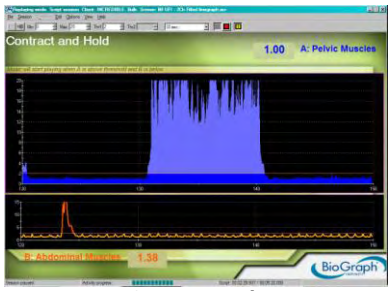


1a. Verify signal

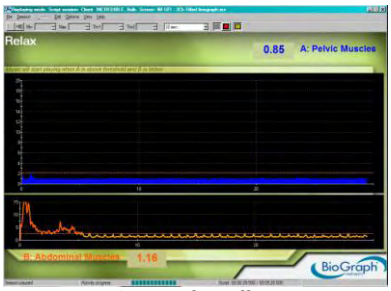
1b. Instructions



1c. Pre-baseline



2. Rest-Work



3. Post baseline

This sample script was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12). You can then review the session with the screen **2Ch Report-Review PMD 10-10sec 10 cycles** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

PERINEAL TRAINING WITH TEMPLATE (SCRIPTS)

This is a series of work-rest and training scripts focusing on perineal reeducation. The scripts in the first section provide short exercise sessions (1 to 2 minutes) with simple templates. The scripts in the second section are longer sessions with complex templates and they can be used in the design of a treatment program.

Templates give a means of setting a goal line that varies in the type of contractions to be done. In a sense they provide a lesson plan for the patient to follow as opposed to having the exercise verbalized. In general these templates combine gradual, quick and sustained contractions with gradual and sustained release. Sharp peaks represent quick contractions; plateaus higher than 2µV are sustained contractions; and plateaus at 2µV or lower for sustained release/relaxation (this is assuming the resting level is around 2µV).

Naturally, following a template requires practice and precise muscle control. With unstable muscle activity it is difficult to trace the lines with the EMG signal. For a beginner patient, select a level that they can easily achieve, that is, a level within the range of their contractions (evaluated with the Maximal Force Assessment script, for instance). To do this, change the vertical scale maximum value to the patient's maximal contraction. Read *Adjusting Scales and Threshold*, page 17, for more information. Then gradually increase the level as their skill improves. Different positions can also used to help the muscle in template training. Work incrementally at each stage starting with the supine position where muscles are relaxed, then the sitting position where the back muscles come into play, and finally the standing position, which is the most difficult since more muscles are used to stay upright.

When the patient reaches the lowest point on a template, allow them to release completely even if it goes below resting levels. This gives a chance for the muscle to fully relax between contractions.

Note that channel B is dedicated to the monitoring of the abdominal muscles, which have to remain relaxed when the pelvic muscles (channel A) are contracted.

These short and long protocols (with associated review screens) can be accessed by clicking the **Quick Start** button.

Category: CONTINENCE – Short Template Training Protocols

Protocols used for short templates

- **C – 05 – Perineal Reeducation 10-10 sec**
- **C – 06 – Perineal Reeducation 4-4 sec**
- **C – 07 – Perineal Reeducation 4-8 sec**
- **C – 08 – Perineal Reeducation 6-12 sec**
- **C – 09 – Perineal Reeducation 6-6 sec**
- With the review screen **2Ch Perineal Reeducation**

Category: CONTINENCE – Long Template Training Protocols

Protocols used for long templates

- **C – 10 – Perineal Control Start-Treatment**
- **C – 11 – Perineal Control Mid-Treatment**
- **C – 12 – Perineal Control End-Treatment**
- **C – 13 – Controlled Perineal Contraction**
- **C – 14 – Held Perineal Contraction**
- **C – 15 – Perineal Control Hypertonicity**
- **C – 16 – Perineal Control Hypotonicity**
- **C – 17 – Postpartum Perineal Tonicity**
- **C – 18 – Relaxation of Perineal Muscles**
- **C – 19 – Stress Incontinence**

With the review screen **2Ch Perineal Reeducation**

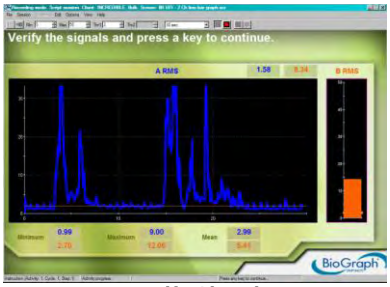
SHORT TRAINING SCRIPTS

These scripts can be found in the script category **Short Template Training**.

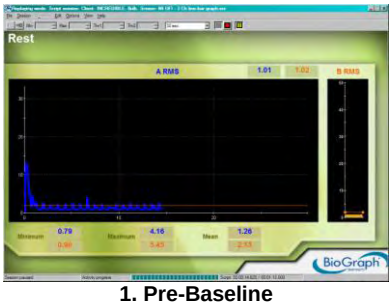
- **Perineal Reeducation 10-10 sec** (Duration: around 2 minutes)
- **Perineal Reeducation 4-4 sec** (Duration: around 1 minute)
- **Perineal Reeducation 4-8 sec** (Duration: 1 minute and a half)
- **Perineal Reeducation 6-12 sec** (Duration: 2 minutes)
- **Perineal Reeducation 6-6 sec** (Duration: 1 minute and a half)

Each script is made up of 3 activities:

1. **Pre-baseline**; Divided into 2 steps:
   a. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
   b. **Pre-Baseline:** Relax muscles to determine initial resting level. Duration is 15 seconds. Adjust channel B threshold.
2. **Work-Rest:** Template exercise starting with a contraction then a relaxation cycling 5 times. Duration depends on the work and rest parts.
3. **Post-Baseline:** Relax muscles to determine new resting level. Duration is 15 seconds.

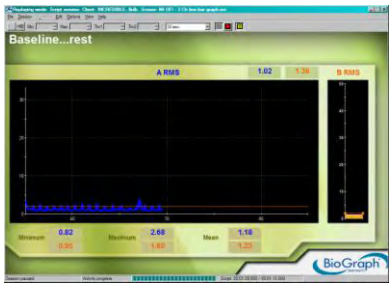


Verify Signal



1. Pre-Baseline

2. Work-Rest



3. Post Baseline

REVIEW AND REPORT

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12).

You can then review the session with the screen **Report Review – 2Ch Perineal Reeducation** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

LONG TRAINING SCRIPTS

The scripts in this section allow you to customize a course of treatment for your patient. Each planned exercise has a template screen that the person can follow. These scripts can be found in the script category of **Long Template Training**.

As a guide, there are three 10-minute scripts that are designated as the start, middle and end of the treatment:

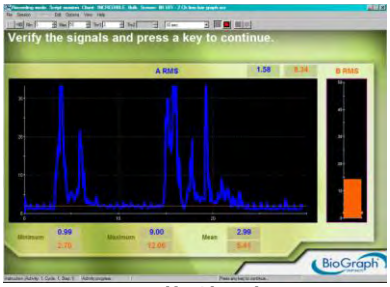
- **Perineal Control Start-Treatment**
- **Perineal Control Mid-Treatment**
- **Perineal Control End-Treatment**

Other scripts are also available:

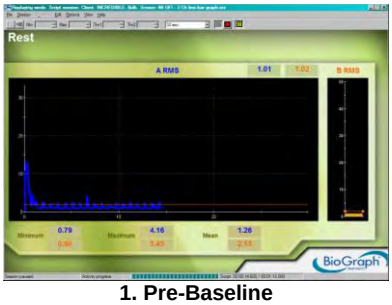
- **Controlled Perineal Contraction** (Duration: around 15 minutes)
- **Held Perineal Contraction** (Duration: around 12 minutes)
- **Perineal Control Hypertonicity** (Duration: around 4 minutes)
- **Perineal Control Hypotonicity** (Duration: around 15 minutes)
- **Postpartum Perineal Tonicity** (Duration: around 15 minutes)
- **Relaxation of Perineal Muscles** (Duration: 2 minutes)
- **Stress Incontinence** (Duration: around 10 minutes)

Each script is divided into 3 activities:

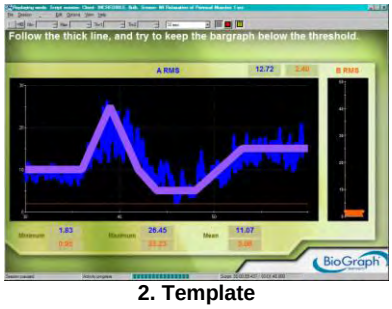
1. **Pre-baseline**; Divided into 2 steps:
    a. **Verify signal:** Take the time to make sure the sensor and cables are connected properly. No data is recorded. Pressing any key on your keyboard allows you to advance to the next activity.
    b. **Pre-Baseline:** Relax muscles to determine initial resting level. Duration is 15 seconds. Adjust channel B threshold.
2. **Template exercise:** Follow the mauve line by controlling muscle contractions. Data is recorded. The duration of this part depends on the template.
3. **Post-Baseline:** relax muscles to determine new resting level. Duration is 15 seconds.



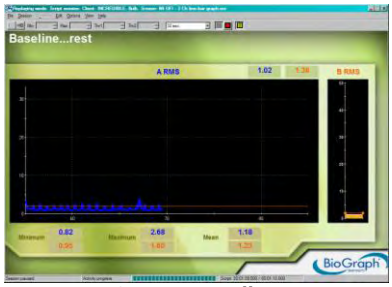
Verify Signal



1. Pre-Baseline



2. Template



3. Post Baseline

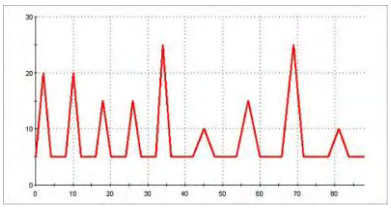
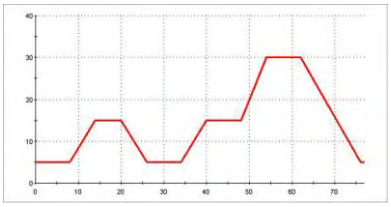
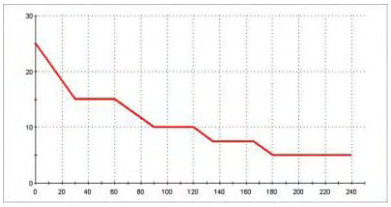
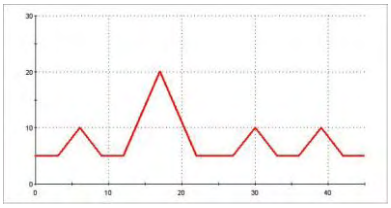
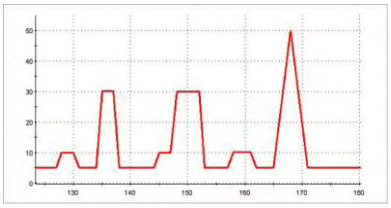
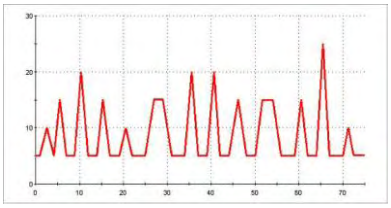
REVIEW AND REPORT

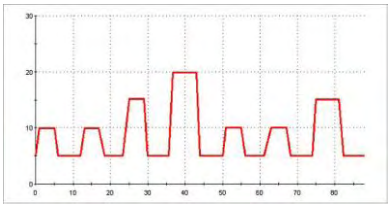
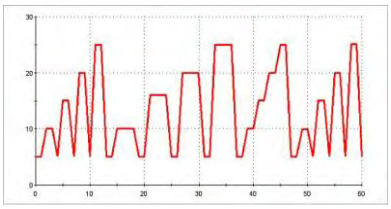
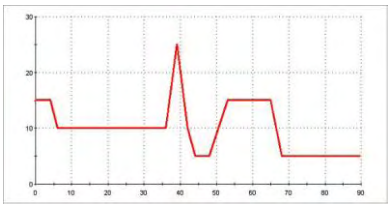
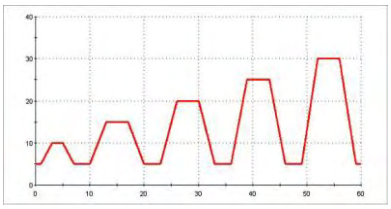
At the end of the session, you can enter session notes (see *Stopping a Session*, page 12).

You can then review the session with the screen **Report Review – 2Ch Perineal Reeducation** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

PERINEAL TRAINING TEMPLATES

For clarity, only one cycle of each of the templates is shown. However, many of them are repeated a number of times to give a total duration appropriate for the training to be undertaken.

Controlled Perineal Contractions	
Held Perineal Contractions	
PC Hypertonicity	
PC Hypotonicity	
Perineal Control End-Treatment	
Perineal Control Mid-Treatment	

Perineal Control Start-Treatment	
Postpartum Perineal Tonicity	
Relaxation of Perineal Muscles	
Stress Incontinence	

OPEN DISPLAY EXERCISES

The objective of using an open display is to provide variety and engage the patient in more challenging feedback.

Within each training category, selected training screens have been grouped with appropriate review screens to create one or more predefined session configurations called **Favorites**. The purpose of these groupings to to provide well-balanced training sessions, starting with the easiest exercises and progressing to the more challenging ones. Favorites are accessed by clicking the Quick Start button.

For more information about Favorites, read the section *Starting a session from a Favorite* on page 8.

CATEGORY: STRENGTHENING

These strengthening screens are used primarily for reinforcing muscle contractions of channel A.

Note that channel B is dedicated to the monitoring of the abdominal muscles, which have to remain relaxed when the pelvic muscles (channel A) are contracted.

These screen groupings (with associated review screens) can be accessed by clicking the **Quick Start** button.

Category: CONTINENCE – Strengthening Training

Group Name: C - STRN01 - Strengthening with 1 EMG

- **Strengthening – 1Ch Jumping Car**
- **Strengthening – 1Ch Jumping Puppet**
- **Strengthening – 1Ch Dolphin Puzzle**
- **Strengthening – 1Ch Fractal 06**
- **Strengthening – 2Ch Filled Line Graph**
- With the review screen **1Ch Open Display**

Group Name: C - STRN02 - Strengthening with 2 EMG

- **Strengthening – 2Ch Filled Line Graph**
- **Strengthening – 2Ch Butterflies**
- **Strengthening – 2Ch Hero Morph-Slow**
- **Strengthening – 2Ch Drying Lake**
- **Strengthening – 2Ch Flower Explosion**
- With the review screen **2Ch Open Display**

Group Name: C - STRN03 - Strengthening with 2 EMG

- **Strengthening – 2Ch Conditional DVD**
- **Strengthening – 2Ch Hero Morph-Fast**
- **Strengthening – 2Ch Filled Line Graphs**
- **Strengthening – 2Ch Turtle**
- **Strengthening – 2Ch Fading Mouse**

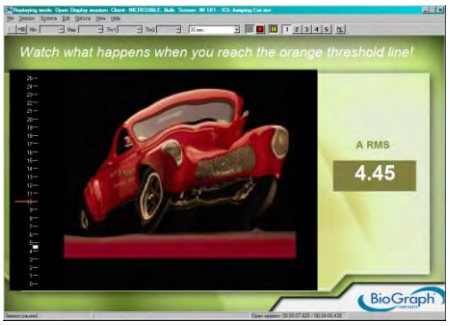
With the review screen **2Ch Open Display**

Strengthening - 1Ch Jumping Car

The car morphs to upbeat music when the signal is above the threshold. The music softens as the signal nears the orange line from above, and gets louder as the signal moves away.

The car stops moving and a constant tone can be heard when the signal is below the threshold.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.

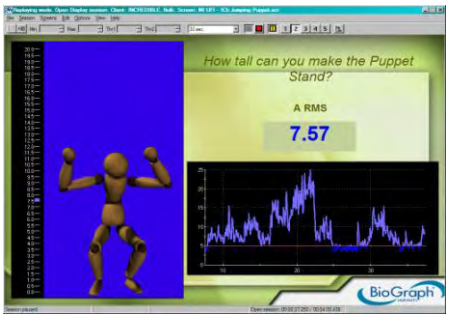


Strengthening - 1Ch Jumping Puppet

The puppet's posture is dependent on the scale of the animation; therefore, the puppet is completely extended when the EMG is above the maximum scale setting. Try changing the upper scale of the animation as if it was a threshold.

There is no audio feedback.

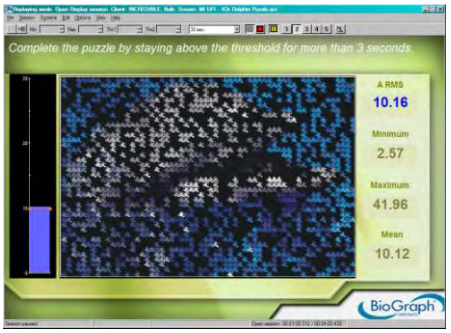
This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.



Strengthening - 1Ch Dolphin Puzzle

A song will be heard immediately when the signal goes above the threshold setting on the bargraph. But, a sustained contraction of at least 3 seconds above threshold is required before pieces start to fill in the Dolphin puzzle. When the signal goes below threshold, the song stops as well as the animation. Both resume as soon as the signal goes above the threshold.

Changing the scales on the bargraph will not impact the display; the threshold setting controls the display.

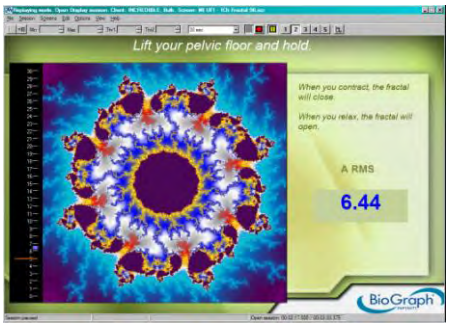


Strengthening - 1Ch Fractal 06

The fractal partially closes when the signal is above the threshold, and opens up and disappears when the signal is below. The complete animation cycle is about 40 seconds.

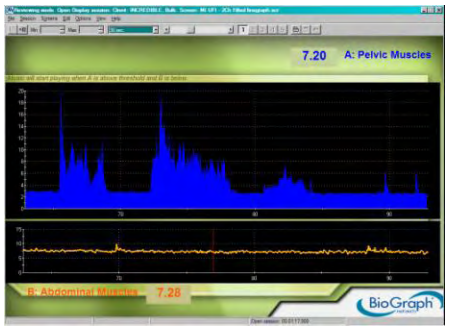
Audio feedback is available both above and below the threshold. Above is a song, and below are birds.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.



Strengthening - 2Ch Filled Line Graph

The audio feedback is conditional to both channels of EMG. Music will play when channel A is above its threshold and channel B is below. If B exceeds its threshold the music stops. Also notice the color changes on the graphs as the signal crosses the threshold.

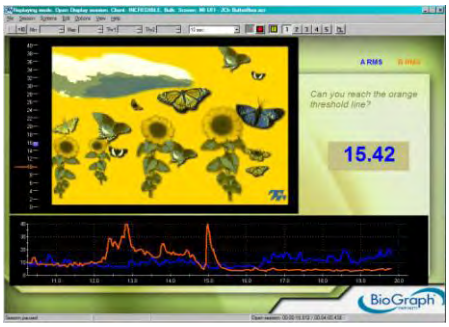


Strengthening - 2Ch Butterflies

Butterflies and flowers appear to the sound of chirping birds when the signal goes above the threshold. But the butterflies and flowers disappear as a relaxing song plays when the signal goes below the threshold.

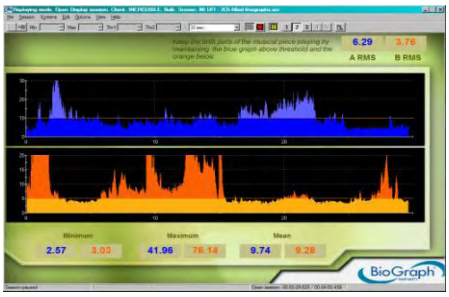
The animation cycle is very short: about 3-4 seconds.

This display can also be used for relaxing.



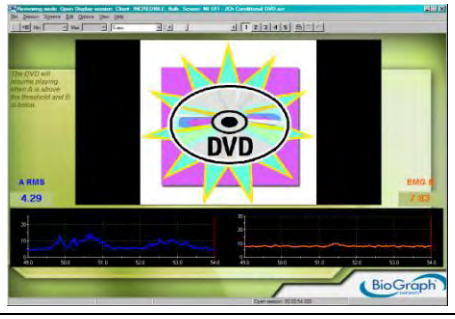
Strengthening - 2Ch Filled Line Graphs

The audio feedback is a midi splitter musical piece. Each channel represents different parts of the musical piece. When Channel A is above its threshold and Channel B is below its threshold both parts are heard. When both channels are out of condition the song stops playing. If either condition is not met only one part is heard.



Strengthening - 2Ch Conditional DVD

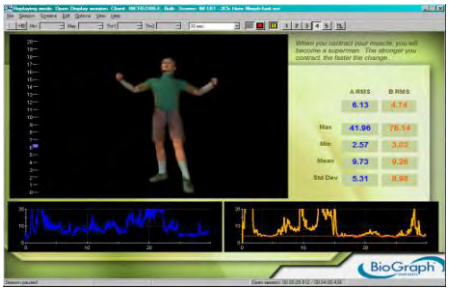
The DVD stays on when the Channel A signal is above its threshold and Channel B signal stays below. If either condition is not met the DVD stops playing.



Strengthening - 2Ch Hero Morph-Fast

The animation represents Channel A and is dependent on the scale on the left. The boy morphs into a superman when Channel A's signal is toward the upper range of the scale. As the signal comes down the scale, the superman returns to a boy.

No audio feedback.



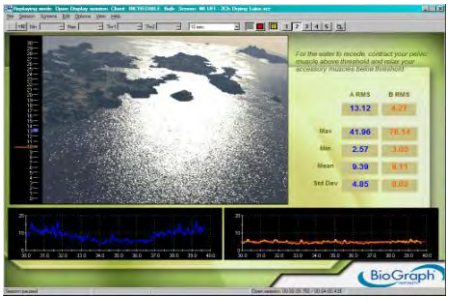
Strengthening - 2Ch Hero Morph-Slow

The animation is connected to Channel A, and is threshold dependent. Once the signal goes above its threshold the boy slowly morphs into a superman. The complete animation cycle is about14 seconds. There is an audio tone heard when the signal is above threshold. If Channel B exceeds its threshold the animation resets to the beginning. The animation can also be reset manually.

Strengthening - 2Ch Drying Lake

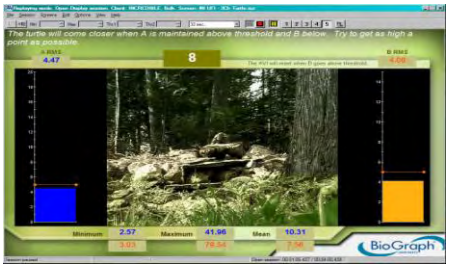
The water recedes and seagulls can be heard as channel A stays above the threshold and the channel B stays below. Both animation and sound stop when the Channel A falls below the threshold. The animation resets once the Channel B goes above the threshold.

The animation can be reset manually and its cycle is about 20 seconds.



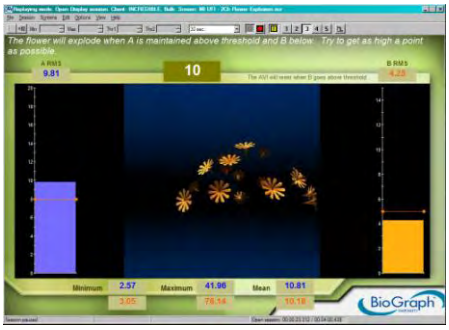
Strengthening - 2Ch Turtle

The picture of a turtle will slowly zoom in when Channel A is above its threshold and B is below. The picture will freeze if A falls below its threshold. Both picture and counter will reset if Channel B exceeds its threshold. The counter maintains the length of time these conditions are met. The complete animation cycle takes about 24 seconds.



Strengthening - 2Ch Flower Explosion

The animation is conditional to both channels. As channel A stays above its threshold and channel B stays below, the flower explodes. A counter represents the length of time A is above and B is below. If channel A falls below its threshold the cycle is suspended. If channel B exceeds its threshold, the flower and the counter reset to the beginning. The complete animation cycle is about 30 seconds.



Strengthening - 2Ch Fading Mouse

As Channel A stays above its threshold on the bargraph and Channel B stays below, the picture will focus. The counter will display the length of time this condition is being met. If Channel B exceeds its threshold the animation and the counter reset.

This animation can be reset manually. There is no audio feedback on this display, and the animation cycle is about 47 seconds.

Feedback is initiated when the signal crosses the threshold of the graph or scale displaying that signal. In order for the reward to be effective, the contraction must be sustained above the threshold for a period of time. Therefore, the threshold setting is not a goal in and of itself; the sustained contraction is the goal. Set the threshold such that it is attainable by the patient. For instance, 40% of the average of a 10 second contraction would be achievable. Most clinicians make a judgment call for each patient depending on how the person performed during their assessment from that session. For more information, see *Adjusting Scales and Threshold,* page 17.

In order for the muscle to improve its ability to sustain a contraction it must have time to rest and recover between contractions. However, open display screens do not have built-in cycles of work and rest; therefore, you must remember to cue the patient during a rest.

Several of the strengthening screens have conditional requirements for both channels A and B. Typically, channel A must stay above its threshold and channel B must stay below for the reward to kick in. If one of the conditions is not met, then the reward is not provided or the animation is reset to the beginning of its cycle. (Note that some of the animation cycles are short and some of them are as long as 30 seconds). Although both conditions must be maintained for the reward, a beginner patient with extremely poor muscle tone can utilize all of these open display screens.

CATEGORY: RELAXATION

The relaxation screens are designed to reinforce lowering levels of EMG activity. The rewards are typically set to encourage EMG activity to fall below its threshold. As the patient releases muscle tension/activity they are rewarded through audio and visual feedback, usually linked to an animation or signal display.

These screen groupings (with associated review screens) can be accessed by clicking the **Quick Start** button.

Category: CONTINENCE – Relaxation Training

Group Name: C - RELAX01 - Relaxation with 1 EMG

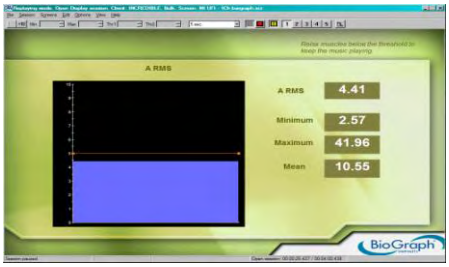
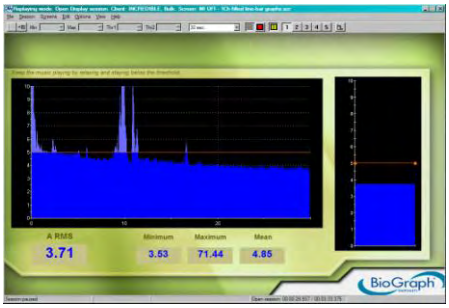
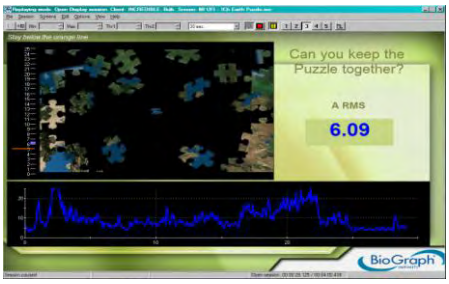
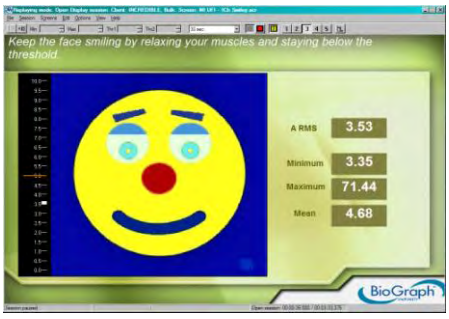
- **Relaxation – 1Ch Bar Graph**
- **Relaxation – 1Ch Filled Line-Bar Graphs**
- **Relaxation – 1Ch Earth Puzzle**
- **Relaxation – 1Ch Growing Fractal**
- **Relaxation – 1Ch Parrot Puzzle**
- With the review screen **1Ch Open Display**

Group Name: C - RELAX02 - Relaxation with 1 EMG

- **Relaxation – 1Ch Filled Line-Bar Graphs**
- **Relaxation – 1Ch Smiley**
- **Relaxation – 1Ch Parrot Puzzle Bar Graph**
- With the review screen **1Ch Open Display**

Group Name: C - RELAX03 - Relaxation with 2 EMG

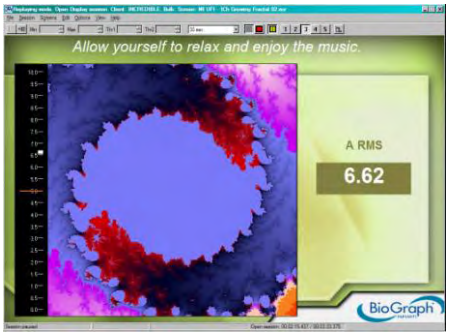
- **Relaxation – 2Ch Closing Circle**
- **Relaxation – 2Ch Relaxation with DVD**
- **Relaxation – 2Ch Line-Filled Graphs**
- **Relaxation – 2Ch Relaxation Green Light**
- With the review screen **2Ch Open Display**

Relaxation - 1Ch Bar Graph A simple bargraph display ideal for individuals that need help focusing on relaxation. When the threshold is set above the patient's resting level soft music is heard as long as the signal stays below its threshold. The objective is to assist relaxation through soothing audio feedback.	
Relaxation - 1Ch Filled Line-Bar Graphs A simple filled linegraph display. As the EMG activity falls below the linegraph's threshold, hearing music will reward the patient.	
Relaxation - 1Ch Earth Puzzle A more actively challenging display for relaxation when you set the animation threshold below the patient's resting level. As the EMG activity relaxes, the patient is rewarded by puzzle pieces filling in fast and a constant low pitch tone is heard. A single tone alarm is heard whenever the EMG activity returns to a level above the animation's threshold.	
Relaxation - 1Ch Smiley A sustained contraction of about 3-4 seconds above threshold turns the smiley face into a frowning one and eliminates the music. Relaxing the muscle activity for about 3-4 seconds below threshold returns to a smiley face and plays a joyful song.	

Relaxation - 1Ch Growing Fractal

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.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.

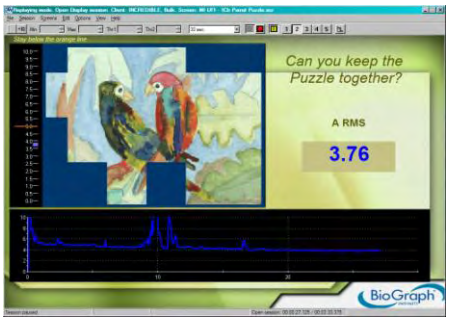


Relaxation - 1Ch Parrot Puzzle

A simple display screen consisting of an animation and a linegraph.

A sustained contraction of about 20 seconds above threshold removes the puzzle pieces. A release of the muscle activity of about the same duration below threshold fills in the puzzle and plays a relaxing song.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.

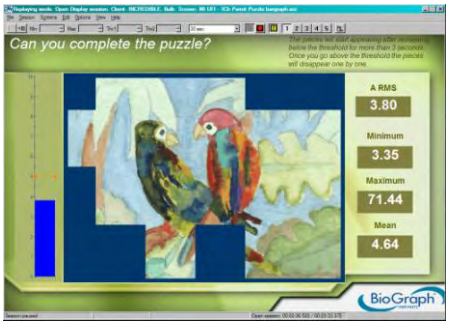


Relaxation - 1Ch Parrot Puzzle Bar Graph

This screen consists of an animation and a bargraph. The animation cycle is approximately 40 seconds. A sustained contraction of about 20 seconds above threshold removes all the puzzle pieces. A sustained release/relaxation of about 20 seconds below threshold completes the puzzle, and rewards the patient with soft music.

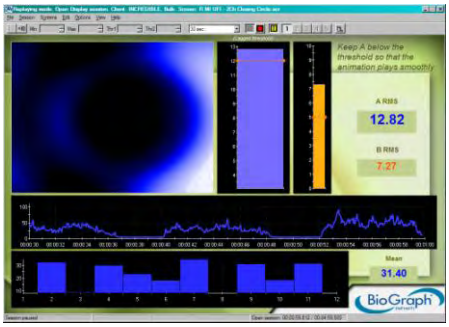
As soon as the signal goes below the threshold, soft music plays, but the pieces only start filling in after 3 seconds.

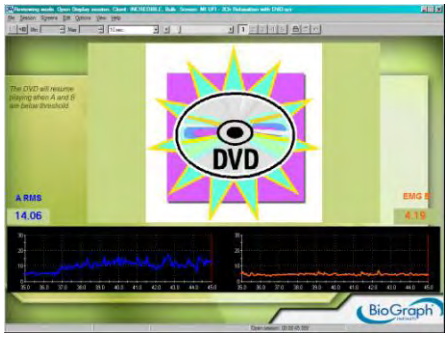
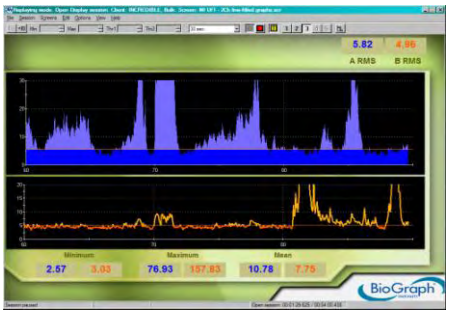
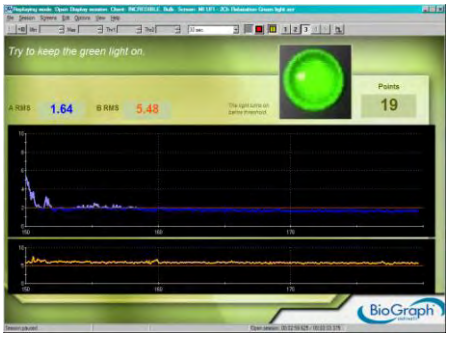
This display can also be used for strengthening.



Relaxation - 2Ch Closing Circle

This display shows the signal on a bar graph and plays a warm tone, as well as an animation when the amplitude dips below the threshold. The threshold is set to automatically follow the signal, in order to encourage the patient to release muscle tension.



Relaxation - 2Ch Relaxation with DVD The DVD will play as long as both channels are below their threshold. If either goes above threshold, the DVD pauses. *This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.*	
Relaxation - 2Ch Line-Filled Graphs Channel A is the filled line graph and channel B the single line graph. Both signals change color when crossing the threshold. Soft music is heard when both channels are below threshold. If either channel moves above threshold the music stops.	
Relaxation - 2Ch Relaxation Green Light As channel A goes below the threshold notice the signal's colour changing, music playing, and the green light brightening. A counter linked to the blue linegraph represents the length of time channel A activity is staying below its threshold. If A crosses above the threshold the counter resets to 0 and the music stops. *This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.*	

CATEGORY: CONTROL

After the patient has gained some muscle control they can test their newly developed skill with more difficult exercises where the level of contraction must be controlled.

The variable in using these screens for well-conditioned muscle tone vs. extremely poor muscle tone is the scale of the animation and/or the threshold setting. To learn how to adjust these parameters, see For more information, see *Adjusting Scales and Threshold,* page 17.

This screen grouping (with associated review screen) can be accessed by clicking the **Quick Start** button.

Category: CONTINENCE – Control Training

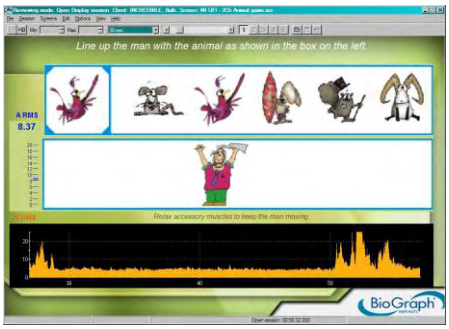
Group Name: C - CTRL01 - Control with 2 EMG

- **Control – 2Ch Animal Game**
- **Control – 2Ch Filled Line Graphs**
- **Control – 2Ch Growing Shape**
- With the review screen **2Ch Open Display**

Control - 2Ch Animal Game

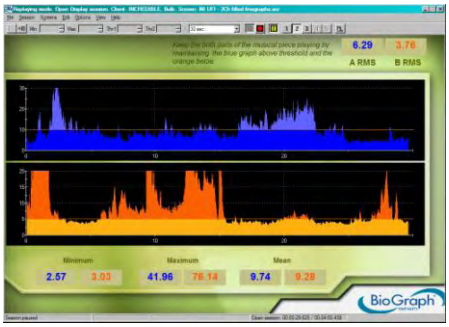
An exercise to control muscle contraction by lining up the cartoon man with the animal in the blue square while the line-up of animals constantly changes. Channel A is connected to the animation. The stronger the contraction, the further the man moves to the right. To keep the man moving, the signal from channel B should remain below its threshold.

Adjusting the maximum scale setting on the animation can make the game easier or more difficult. The higher the scale setting, the stronger the contraction must be to move the man to the far right. See *Adjusting Scales and Threshold,* page 17.



Control - 2Ch Filled Line Graphs

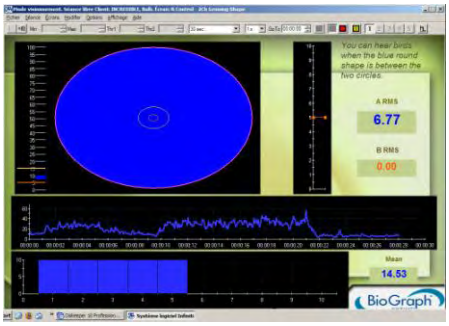
The audio feedback is a midi splitter musical piece. Each channel represents different parts of the musical piece. When channel A is above its threshold and channel B is below its threshold, both parts are heard. When both channels are out of condition the song stops playing. If either condition is not met, only one part is heard.



Control - 2Ch Growing Shape

The stronger the contraction is on channel A, the smaller the circle is. There are two thresholds dividing the space into three areas. Music is played if the circle is in the center area.

The signal from channel B should remain below its threshold.



CATEGORY: TRAINING

After the patient has gained some muscle control they can test their newly developed skill with more difficult screens. The first few displays provide different exercises involving contractions and releases using various animations. A couple of screens deal with sustaining release below resting levels. The remaining screens have simple templates that the patient can follow.

The templates shown are for one cycle and only go up as high as 10µV. Also, in an open display recording these guides will go on continuously until the session is stopped. When the patient reaches the lowest level of the template allow them to go lower if they can. For more complicated templates and suggestions on how to train with them see *Perineal Training Templates* on page 49.

These screen groupings (with associated review screens) can be accessed by clicking the **Quick Start** button.

Category: CONTINENCE - Animation Training

Group Name: C - TRNG01 - Training with 2 EMG

- **Training – 2Ch Animal Game**
- **Training – 2Ch Car Race**
- **Training – 2Ch Green Light**
- **Training – 2Ch Growing Sphere**
- **Training – 2Ch Maze**

- With the review screen **2Ch Open Display**

Category: CONTINENCE - Template Training

Group Name: C - TRNG02 - Training with 2 EMG

- **Training – 2Ch Template Pyramid**
- **Training – 2Ch Template Trapezoid**
- **Training – 2Ch Template Ramp**
- **Training – 2Ch Template Hill**
- With the review screen **2Ch Open Display**

Group Name: C - TRNG03 - Training with 2 EMG

- **Training – 2Ch Template Giza Pyramids**
- **Training – 2Ch Template Two-Sided Steps**
- **Training – 2Ch Template Steps**
- **Training – 2Ch Template Triangles-Rectangles**
- With the review screen **2Ch Open Display**

Group Name: C - TRNG04 - Training with 2 EMG

- **Training – 2Ch Template Control Perineal – Start Treatment**
- **Training – 2Ch Template Control Perineal – Mid Treatment**
- **Training – 2Ch Template Control Perineal – End Treatment**
- With the review screen **2Ch Open Display**

Group Name: C - TRNG05 – Training with 2 EMG

- **Training – 2Ch Template PC Hypotonicity**
- **Training – 2Ch Template Stress Incontinence**
- **Training – 2Ch Template Held Perineal Contractions**
- **Training – 2Ch Template Controlled Perineal Contractions**
- **Training – 2Ch Template Postpartum Perineal Tonicity**
- With the review screen **2Ch Open Display**

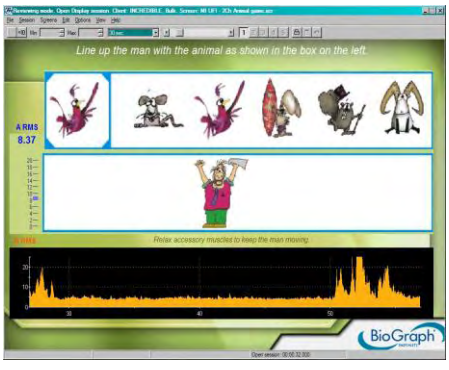
Group Name: C - TRNG06 - Training with 2 EMG

- **Training – 2Ch Template Work-Rest 10-10sec**
- **Training – 2Ch Template Work-Rest 6-12sec**
- **Training – 2Ch Template Work-Rest 6-6sec**
- **Training – 2Ch Template Work-Rest 4-8sec**
- **Training – 2Ch Template Work-Rest 4-4sec**
- With the review screen **2Ch Open Display**

Training - 2Ch Animal Game

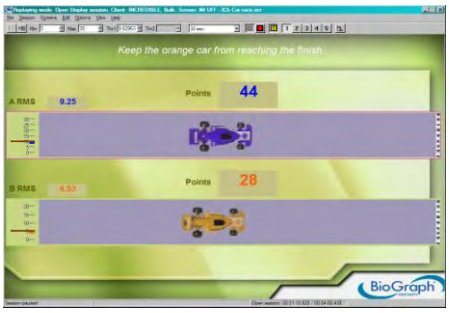
An exercise to control muscle contraction by lining up the cartoon man with the animal as shown in the blue square while the line-up of animals constantly changes. Channel A is connected to the animation. The stronger the contraction the further the man moves to the right, and to keep the man moving the signal from channel B should remain below its threshold.

Adjusting the maximum scale setting on the animation can make the game easier or more difficult. The higher the scale setting the stronger the contraction must be to move the man to the far right. See *Adjusting Scales and Threshold,* page 17.



Training - 2Ch Car Race

The aim is to make the blue car of channel A pass the finish line (the white bar on the far right of each track) before the yellow car of 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.



Training - 2Ch Green Light

This display focuses on training the muscle of channel A to go below its resting level so as to reinforce the notion of release. With practice, the patient learns how to reverse a muscle spasm towards a sustained release of a relaxed muscle.

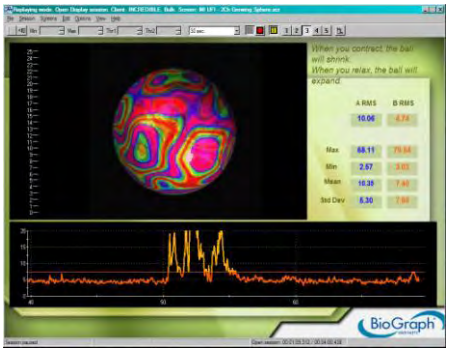
As channel A goes below threshold, the green light turns on. The points represent the length of time the signal stays below the threshold (assuming resting levels are about 2µV). Channel B linegraph does not influence the animation, but simply to monitor accessory muscles.

Training - 2Ch Growing Sphere

Channel A controls the ball. Relaxing the muscle enlarges the ball and contracting it shrinks the ball. Like the screen MI UFI – 2Ch Green light, above, this one can also be used to maintain release below resting levels. Channel B changes colour when it passes the threshold.

Adjusting the maximum scale setting on the animation can make the task easier or more difficult. See *Adjusting Scales and Threshold,* page 17.

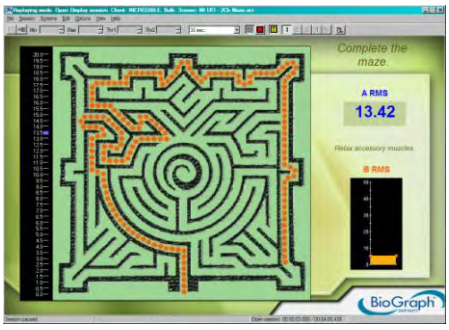
This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.



Training - 2Ch Maze

To complete the maze the muscle of channel A must be contracted enough for the dot to reach the center. The animation stops when channel B goes above threshold.

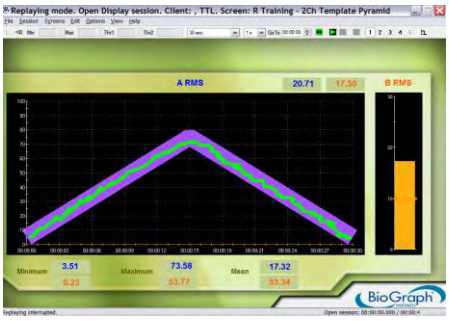
Adjusting the maximum scale setting on the animation can make the task easier or more difficult. The higher the scale setting the stronger the contraction must be to complete the maze. See *Adjusting Scales and Threshold,* page 17.



Training - 2Ch Template Pyramid

The template starts with a contraction; the patient will increase the level of the contractions slowly. Upon reaching the maximum level specified; the patient is asked to decrease the level of contractions until reaching the resting level. Rest duration will follow. The template will be repeated as long as the session will need to last for proper training.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.

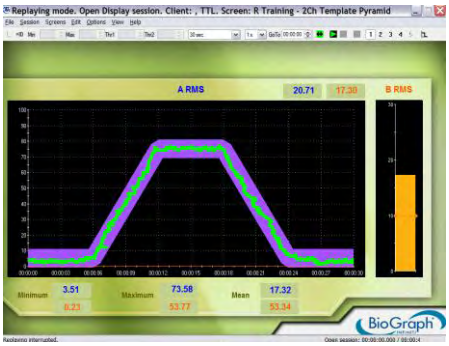


Training - 2Ch Template Trapezoid

The template starts with a rest period for 6sec, then the patient will gradually starts contracting for 12sec in total. Upon reaching the maximum level the patient will have to hold the contraction for 6sec.Going back gradually to the rest position. Another rest period will follow for 6sec.

The template will be repeated as long as the session will need to last for proper training.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.



Training - 2Ch Template Ramp

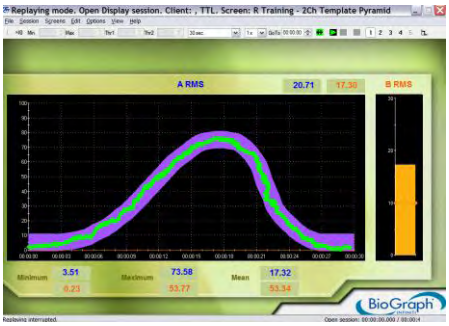
The template starts with a rest period of 5sec, and then the patient will contract for 20sec. A rest period will follow for 5sec.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.

Training - 2Ch Template Hill

The template starts from rest, and the patient will be asked to contract, and increase the contraction level gradually. Upon reaching the maximum level specified, the patient will start decreasing the level of contractions until reaching the resting level. The template will be repeated as long as the session will need to last for proper training.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.



Training - 2Ch Template Giza Pyramids

The template starts with a rest period, followed by 3 contractions. These contractions will increase in intensity. Then a rest period will follow

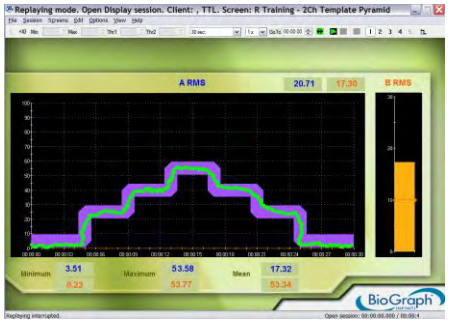
The template will be repeated as long as the session will need to last for proper training.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.

Training - 2Ch Template Two-Sided Steps

The template starts at rest for 5sec, and then the patient is asked to contract and hold the contraction for 4sec. The patient has to increase the level of contractions gradually every 4sec, until reaching the maximum level specified. Then the patient is asked to start decreasing the level of contractions gradually, until reaching the original resting level. The template will be repeated as long as the session will need to last for proper training.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.

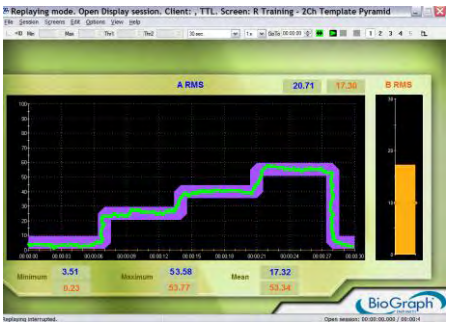


Training - 2Ch Template Steps

The template starts at rest for 7sec, and then the patient is asked to contract and hold the contraction for 7sec. The patient has to increase the level of contractions gradually, and hold for 7sec at each level.

When reaching the maximum level specified, the patient is asked to go back to rest. The template will be repeated as long as the session will need to last for proper training.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.

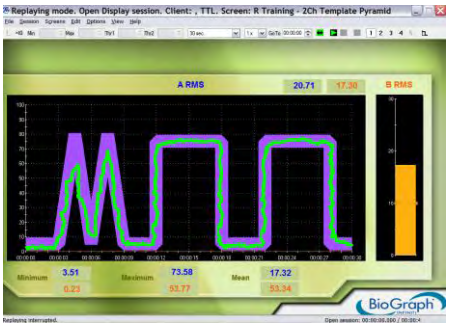


Training - 2Ch Template Triangles-Rectangles

The template starts at rest for 3sec. The patient is then asked to perform two contractions, followed by 3sec of rest. Another contraction is performed; the patient will have to hold the contraction for duration of 6sec followed by 4sec of rest. Another contraction is performed where the patient will hold the contraction for 6sec and then release.

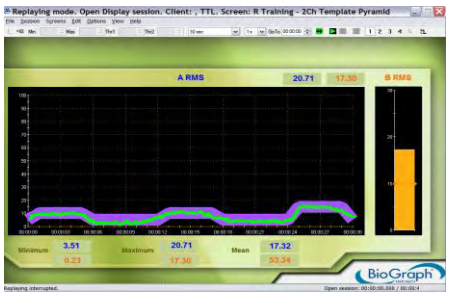
The template will be repeated as long as the session will need to last for proper training.

This sample screen was provided by the Biofeedback Foundation of Europe; designed by Nancy Schully.



Training - 2Ch Template Control Perineal – Start Treatment

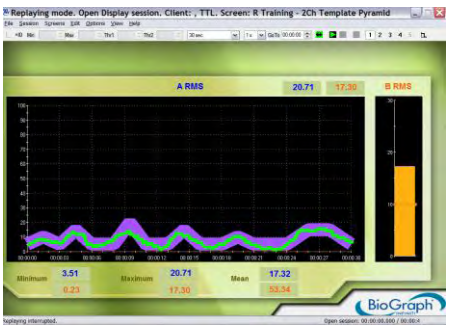
The template consists of a series of contractions. The patient is asked to hold the contractions. There is a rest period of 6sec between each contraction. The level of contractions and the hold period varies.The template will be repeated as long as the session will need to last for proper training.



Training - 2Ch Template Control Perineal – Mid Treatment

The template consists of series of contractions. There will be rest periods in between. The rest periods and hold-contraction periods will vary.

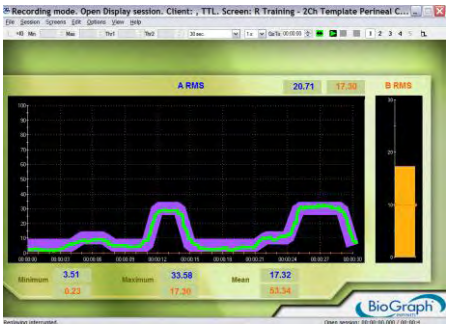
The template will be repeated as long as the session will need to last for proper training.



Training - 2Ch Template Control Perineal – End Treatment

The template starts with a 4sec rest, then a series of different contractions follow, with rest periods in between.

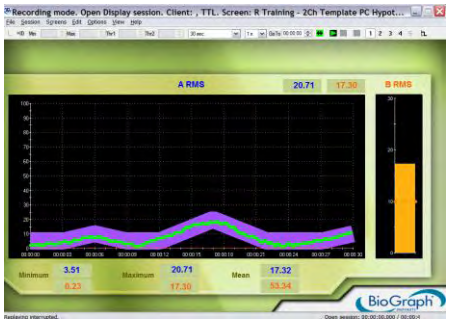
The template will be repeated as long as the session will need to last for proper training.



Training - 2Ch Template PC Hypotonicity

The template starts with 3sec rest, and then a series of quick contractions will follow, with a different rest periods in between.

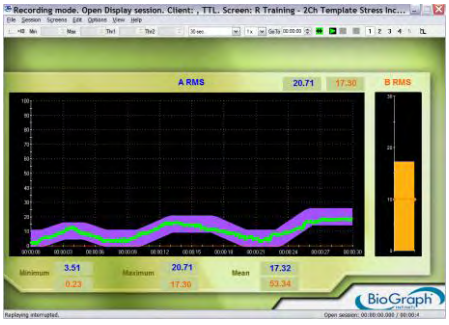
The template will be repeated as long as the session will need to last for proper training.



Training - 2Ch Template Stress Incontinence

The template consists of contractions that will vary in intensity level. The patient will hold each contraction for 3sec. There is a 3sec rest period between each contraction.

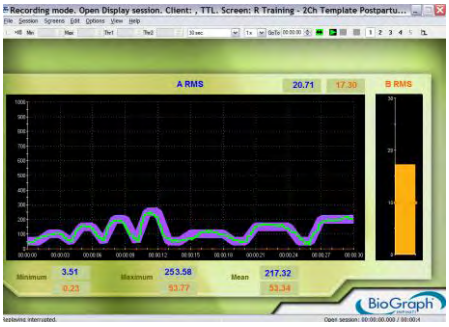
The template will be repeated as long as the session will need to last for proper training.

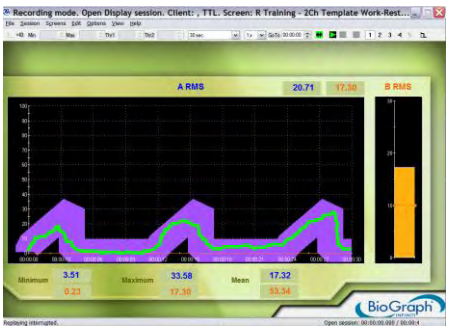
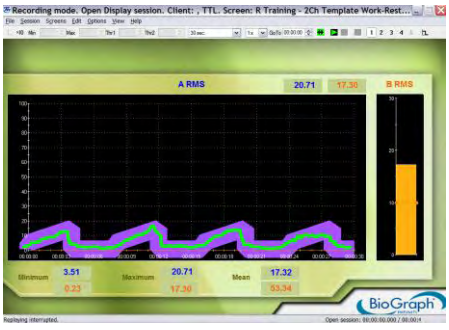


Training - 2Ch Template Held Perineal Contractions

The template starts with 8sec rest. The contractions that will follow differ in intensity.

The template will be repeated as long as the session will need to last for proper training.

Training - 2Ch Template Controlled Perineal Contractions The template consists of quick contractions and rest periods in between. The template will be repeated as long as the session will need to last for proper training.	
Training - 2Ch Template Postpartum Perineal Tonicity The template consists of different contractions and rest periods in between. The template will be repeated as long as the session will need to last for proper training.	
Training - 2Ch Template Work-Rest 10-10sec The template starts with 10sec work, followed by 10sec of rest. The template will be repeated as long as the session will need to last for proper training.	
Training - 2Ch Template Work-Rest 6-12sec The template starts with 6sec work, followed by 12sec of rest. The template will be repeated as long as the session will need to last for proper training.	
Training - 2Ch Template Work-Rest 6-6sec The template starts with 6sec work, followed by 6sec of rest. The template will be repeated as long as the session will need to last for proper training.	

Training - 2Ch Template Work-Rest 4-8sec The template starts with 4sec work, followed by 8sec of rest. The template will be repeated as long as the session will need to last for proper training.	
Training - 2Ch Template Work-Rest 4-4sec The template starts with 4sec work, followed by 4sec of rest. The template will be repeated as long as the session will need to last for proper training.	

REVIEW AND REPORT

At the end of the session, you can enter session notes (see *Stopping a Session*, page 12).

You can then review the session with the screen **Open Display Report-Review** in the category **Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 14.

Bibliography

Cram, J.R., & Kasman, G.S. (1998). *Introduction to Surface Electromyography*. Alexandria: Aspen Publications.

Cram, J.R., & Kasman, G.S., Wolf, S.L. (1998). *Clinical Applications in Surface Electromyography*. Alexandria: Aspen Publications.

Cram., J.R., et al. (1990). *Clinical EMG for Surface Recordings: Volume 2*. Clinical Resources.

Felder, C., Leeson, M.A. (1990). Patello-Femoral Pain Syndrome. *Electromyography: Applications in Physical Therapy*.

Saboe, L. et al. (1990). The Unstable Shoulder. Electromyography: Applications in Physical Therapy.

Woolner, B. (2001). Incontinence. *Expert Series*.

Woolner, B., Corcos, J., Drew, S. (2001). Urinary and Fecal Incontinence. *Electromyography: Applications in Physical Therapy*.

SPECIFICATIONS

MyoTrac3 Device (SA9900)

Size of unit	2.75 inch x 4.95 inch x 0.95 inch
Weight of unit	Approx. 3-5 oz without batteries
Input Impedance	>1,000,000 MΩ
Resolution	0.1µV - RMS
Signal Input Range	0-1000µV
Sensitivity	≤ 0.3µV - RMS
CMRR	≥ 180 dB @ 60/50 Hz
CMRR (Other)	≥ -140dB @ 20Hz to 450Hz
Line Filter (50 or 60Hz)	≥ -40dB
Channel Bandwidth, Wide	20-450Hz, ± 5Hz/ ±50Hz
Channel Bandwidth, Narrow	100-450Hz, ± 10Hz/ ±50Hz
Sample Rate/ Channel	2000 samples per second
Supply Voltage	7.0-9.6 VDC
Current Consumption	10-15 mA @ 9 VDC
Battery Life (Alkaline)	15-20 hours minimum
Low Battery Warning	7.5 VDC ± 0.2
Accuracy	+5%, +0.3µV offset
Digital Signal Processing	True RMS
Data Output Protocol	9600 baud or bits per second

Note: *MyoTrac3 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.*

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 MYOTRAC3 system and all equipment including optional items are 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, or to sensor damage created by static electricity. Do not use this equipment in a dry, static area unless using an anti-static mat or anti-static spray on carpeted areas.

This warranty does not cover damage caused by obvious mechanical mistreatment of the system.

Do not immerse in water.

***IMPORTANT**: Remove dead batteries promptly to prevent corrosion damage.*

RETURNING EQUIPMENT

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

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
  8396 State Route 9
  West Chazy, New York
  12992, USA

- **In Canada**, ship insured to:

  Thought Technology Ltd.
  8205 Montreal/ Toronto Blvd. Suite 223
  Montreal West, Quebec
  Canada H4X1N1

- **For international:**
  - Package must be marked with "**Broker: Livingston International – 133461**"
  - Ship insured to:
  - Thought Technology Ltd.
    8205 Montreal/ Toronto Blvd. Suite 223
    Montreal West, Quebec
    Canada H4X1N1

REPAIR RETURN FORM

- **Be sure to contact us for authorization before returning any equipment!**
- Remove this sheet and include with returned unit(s).
- Include 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 Number _____

_____

_____

Problem _____

_____

_____

_____

_____

_____

_____

_____