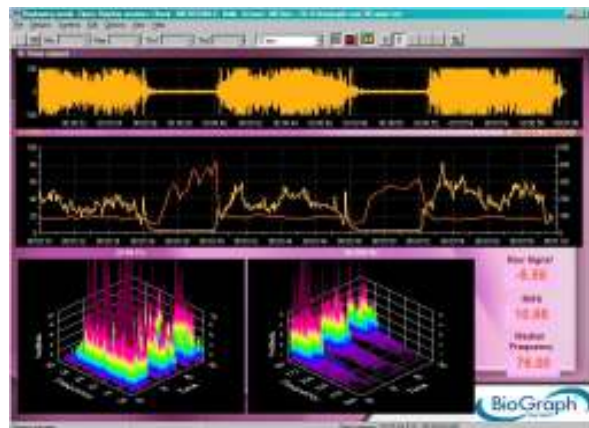# Software Manual

Thought Technology Ltd.

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E-mail: mail@thoughttechnology.com
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$C \epsilon$

| 0413 |

The Manufacturer: Thought Technology Ltd.
2180 Belgrave Avenue
Montreal, Quebec, Canada
H4A 2L8
Product Name: MYOTRAC INFINITI REHAB SUITE
Product #: T9800
Device Name: MYOTRAC INFINITI
Device #: SA9800

| EC | REP |

EMERGO EUROPE
Molenstraat 15
2513 BH, The Hague
The Netherlands
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Fax: +31.70.346.7299

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.
- 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.
- The PC used with MyoTrac Infiniti 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 an increase of $1\mu V$ in the signal reading from a MyoScan-Pro sensor. Be sure to keep in mind that a very relaxed muscle should provide an EMG reading of approximately $1-3\mu V$.
- 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 $1\mu V$ 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 $1-3\mu V$.
- 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.

Manual # SA7976 Revision 4.0

TABLE OF CONTENTS

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 half of this manual will help you get your MyoTrac Infiniti 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
- Quick Start

The second half 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:

Recommended

- **IBM PC compatible, AMD Athlon XP 3000 or higher, Pentium P4 CPU speed 3 GHz or higher or equivalent mobile Laptop CPU.**
- **Desktop or Laptop with two monitor capability**
- **Microsoft® Windows® 2000 with Service Pack 4, or Windows XP with Service Pack 2, or Windows Vista.**
- **50-60 gigabytes hard disk space for video recording and processing. (The software needs 2.5 gigabytes to install and run on available hard drive space)**
- **Memory, 512 MB of RAM or more**
- **CD ROM or DVD drive (DVD drive is required for DVD functions in BioGraph Infiniti)**
- **XVGA graphic card (1024 x 768) or higher resolution adapter & monitor**
- **32 bit Sound Blaster compatible sound card & speakers**
- **1 to 4 USB ports, depending on the desired number of MYOTRAC INFINITI encoders**
- **Mouse or compatible pointing device**
- **MS Word 97 or higher (for printing purposes)**
- **Compact Flash Reader (For use with compact flash card only)**
- **Webcam 30 frames per second (for video purposes only)**
- **Internet access (for updating Software).**

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.

QUICK START

The purpose of this guide is to help you set up your MyoTrac Infiniti system, and to provide you with a rapid overview of the main functions of the BioGraph Infiniti program as well as the Screen Editor Lite. 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 MyoTrac Infiniti unit.

SETUP OF MYOTRAC INFINITI™ SYSTEM

The following pictures illustrate the connections of the MyoTrac Infiniti system.

Connecting USB cable (unit to computer)

Connect one end of the USB cable to your unit where it is marked with the symbol, and the other end to the USB port of your PC or laptop.

Note: USB ports on PCs and the MyoTrac Infiniti device are marked with the symbol ⚓ .

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.

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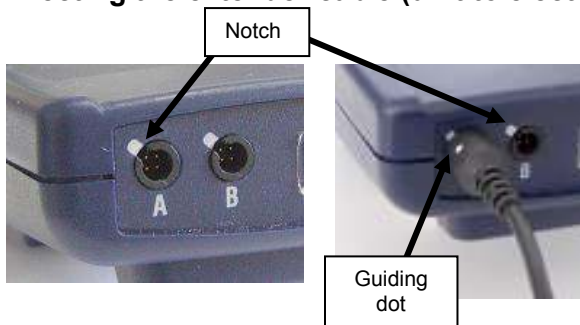
When connecting an extender cable, make sure to properly line up the guiding dot on the top of the plug with the notch in the device's input socket.

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

RECORDING SESSIONS

With the BioGraph Infiniti software, two types of sessions can be recorded: *Open Display* and *Script sessions*.

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

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trended across sessions to reflect patient progress and to help determine the type of exercise and/or practice that is needed by the patient.

Starting the Program

After making the necessary connections briefly described above, turn on your MyoTrac Infiniti unit. Start the BioGraph Infiniti software, with the Rehab suite installed.

To start the program, simply double-click on the BioGraph Infiniti icon, on the Desktop:

The program always starts by showing the Main Menu screen:

Main Menu Screen

First Time Run: Notch Filter Options

Before you start to record, make sure to set up the global notch filter to block certain frequencies caused by electrical interference from showing up in your data.

- Select **Options** at the top left of the main screen.
- Select **Notch Filter** from the drop-down menu.
- Select **EMG**, and set **Frequency** to **50Hz** or **60Hz**, depending on the transmission frequency used in your country. Then click **OK**.

This setting will remain until you change it.

Notch Filter dialog box

Script Session

- Select **Start Script Session** from the Main Menu Screen, and then select a Client or create a new Client entry.
  - ○ *Select an existing Client*
  - ○ *To record with a new script:*
    - ▪ Click **Define New Session** to open the Script Database window.
    - ▪ Select **MyoTrac Infiniti** as the encoder communication protocol from the drop-down menu at the top.
    - ▪ Choose a script from the list, and click **OK**. To see thumbnail images of screens used in the chosen script, enable **Picture View**.
  - ○ *To record with a previously recorded script:*
    - ▪ Highlight a previously recorded script under the column **Session** from the Start Session window. This allows you to use the same display screens and any other changes you made during a previous session (see *Changing Script Settings*, page 12).
  - ○ *Create a new Client*
    - ▪ by clicking on **Add New Client**, and fill in at least the person's name and the birth date. Then, follow the steps above for recording with a new script.
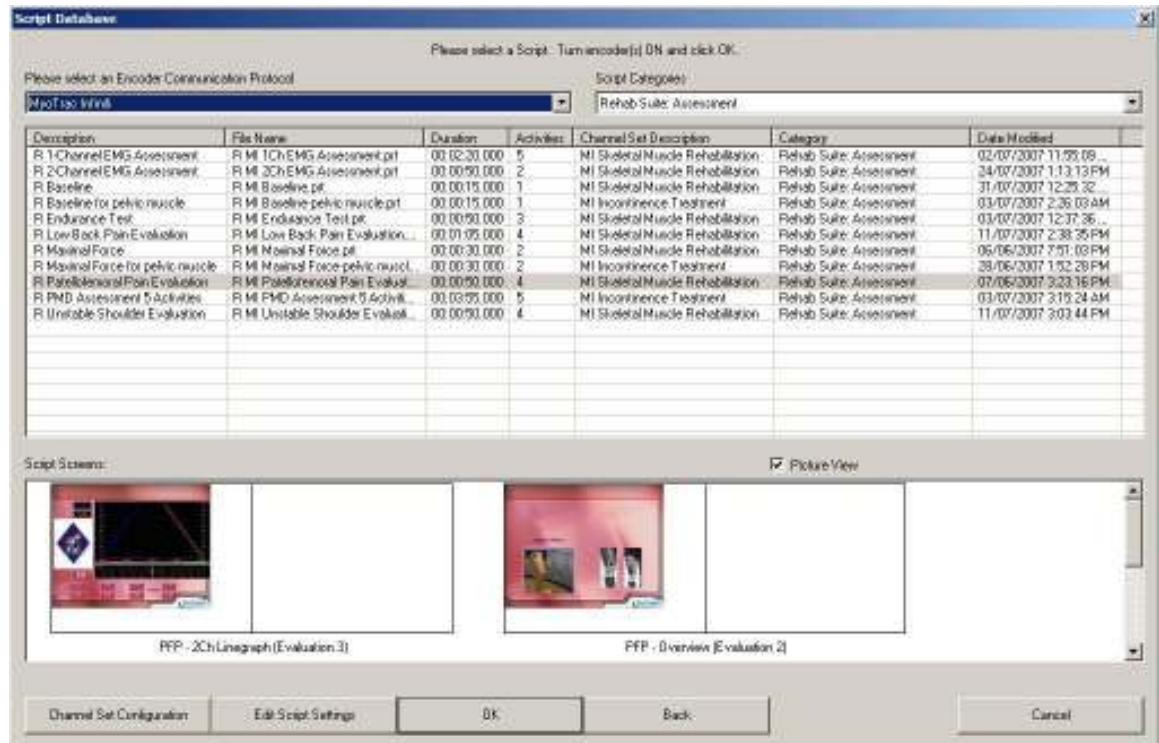
Script Database window

- Click **OK** to go to the recording screen. If you are using your unit for the first time, you are required to enter key codes (see *First Time Run: Entering Key Codes*, page 6)

- Start the script by clicking on the Start button ![start button], and follow the on-screen instructions.

Open Display Session
- Select **Start Open Display Session** from the main screen.
- Highlight your client's name or add it to the list (see *Create a New Client*, page 4).
- Select **Define New Session** to open the **Select up to 5 Screens for Open Display Mode** window.
- Choose MyoTrac Infiniti as the encoder communication protocol.
- Highlight the channel set on the left (there is one for skeletal muscle rehabilitation and one for treatment of incontinence).
- Choose a Screen from the list on the right. To see thumbnail images of available screens, enable **Picture View**.

  Screens are listed by category. Pick a category by clicking on the drop down menu just above the screen list. You can select up to 5 screens by pressing down the CTRL key while clicking with the left mouse button.

Select up to 5 Screens for Open Display Mode window

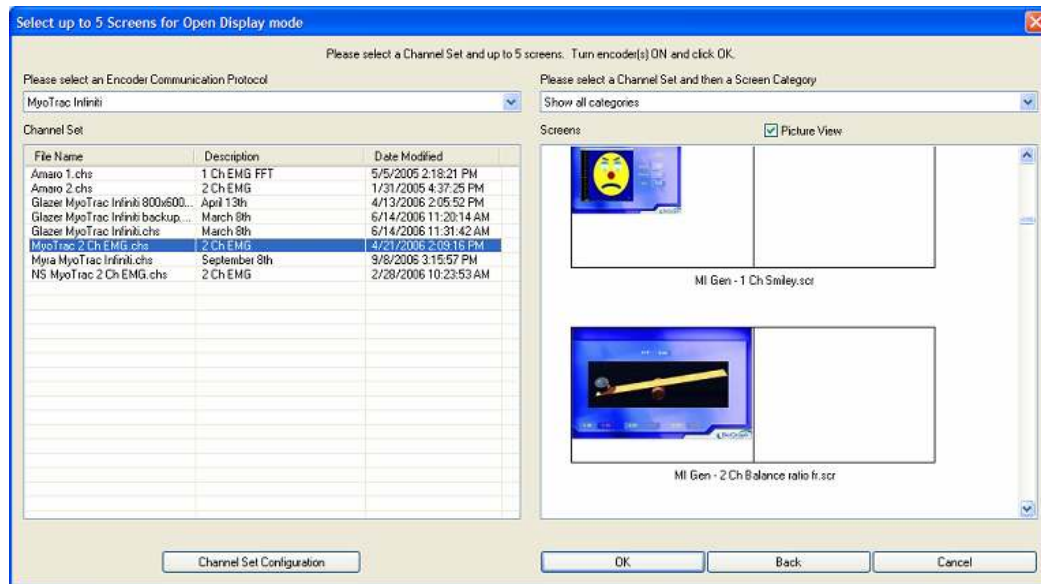- Click **OK** to go to the recording screen. If you are using your unit for the first time, you are required to enter key codes (see *First Time Run: Entering Key Codes* below).

- Start recording by clicking on the Start button .

First Time Run: Entering Key Codes

If this is the very first time you are using your MyoTrac Infiniti unit with your computer, you are required to enter key codes. A dialog box will appear after you have chosen the screens or script you want to record with and clicked **OK** on the **Select up to 5 Screens for Open Display Mode** or **Script Database** windows respectively.

- When the Encoder Key Codes dialog box opens, click to highlight your unit's serial number in the left table (ex. EA1010. This is the same serial number you can see on the back of the unit).
- Enter the **Encoder Key Code** (found inside the battery compartment) in the **Key Code** text box.
- Click on the **--->** arrow button to move the serial number from the left table to the right table. The serial number should now appear in the **Configuration Table**.
- When done, click **OK**.
- Now enter the Application Key Code for your system. This number is found with the encoder key code. Enter the number and click OK when done.
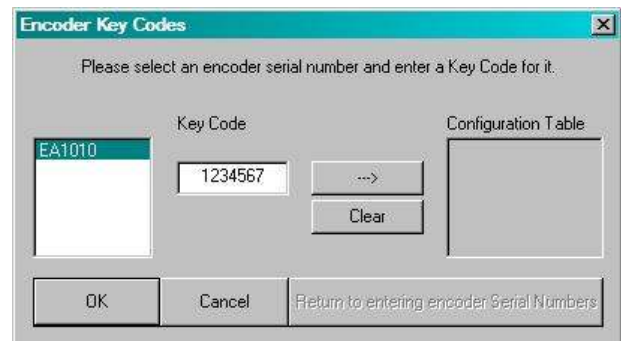
Note: If you are using more than one encoder, you need to enter only one Application Key Code.

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

STOPPING A SESSION

To stop recording a session, click the Stop button:

- The program asks if you want to save the recorded 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 will use the non-compressed format. Keep in mind that compressed files can't be replayed, reviewed or trended until they are decompressed.
- Then the **Session Notes** pop-up appears where you can enter, if you want, a treatment code, a session description and some notes.
- Click **OK** to continue. Next, you are asked if you would like to review the session right away. You can switch to the review mode or the replay mode.
- If you click **No**, the program asks if you want to record another session with the same settings:
- If you click **No**, the program reminds you to turn your encoder off!
- Clicking **OK** takes you back to the Main Menu Screen.

REPLAYING SESSIONS

- Select **Database** from the main screen.
- In the Main Database window highlight the client whose session you want to replay.
- Select the session from the right-hand table.
- Click on **Replay Session** at the bottom.
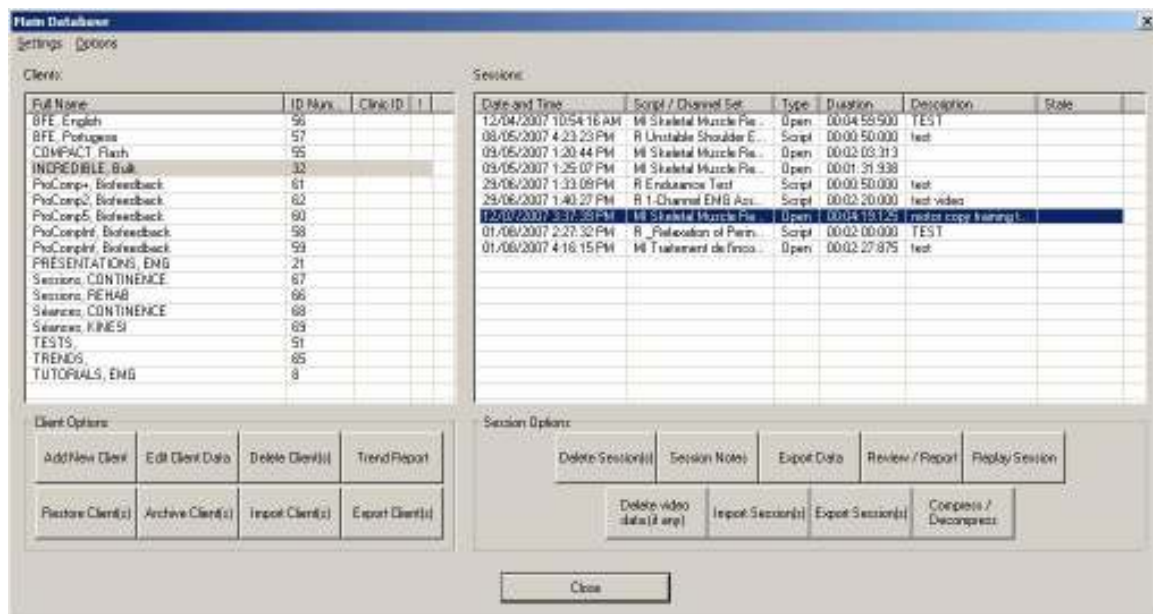
Main Database window

Review/Replay Session Confirmation window

o **If you are replaying a Script Session:** close the Edit Channel Set Setting for Current Client window to go into replay mode.

o **Or if you are replaying an Open Display Session:**
  ▪ Click on **Select Screens** from the Review/Replay Session Confirmation window.
  ▪ In the Select Screens window select up to 5 screens and click **OK**.
  ▪ Click **OK** in the Review/Replay Session Confirmation window to enter replay mode.

  ▪ 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
  • Select **Database** from the main screen.
  • In the Main Database window highlight the client whose session you want to review.
  • Select the session from the right-hand table.
  • Click on **Review/Report** to open the Review/Replay Session Confirmation window.
  • For an open display session, click on **Set Open Display Statistics** and select the statistics you want to be calculated.
  • Click on **Select Screens**.
  • Click on the column heading for **Category** to reorder the screens into groups, and scroll down to **Report-Review** or **Expert** category.
  • Select up to 5 screens and click **OK**.
  • Click **OK** in the Review/Replay Session Confirmation window 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:

  • Select the line graph that contains the segment to be rejected. (Only line graphs can be used for artifact rejection. If you get an error message, select a screen containing a line graph to review the data.)
  • Press and hold the [Control] Key.
  • Place the cursor over one end of the rejected segment.
  • Click and hold the left mouse button. (You can release the [Control] key at this point.)
  • Drag the cursor across the segment to be rejected; it will be highlighted in gray.
  • Release the mouse button at the end of the segment.
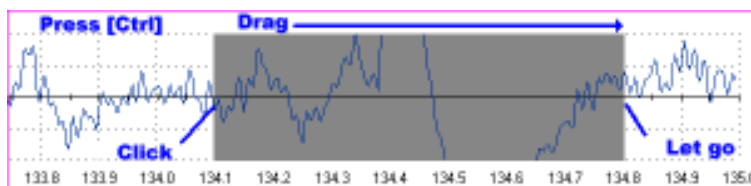
Calculating Statistics

- 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.

- 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

To create a session report, click the **Session Report** button 🖨 in the tool bar. This opens the **Session Report** window, where you select components to include in the report for the selected session.

Select report components by placing a check mark in the desired boxes and click **Generate Report**.
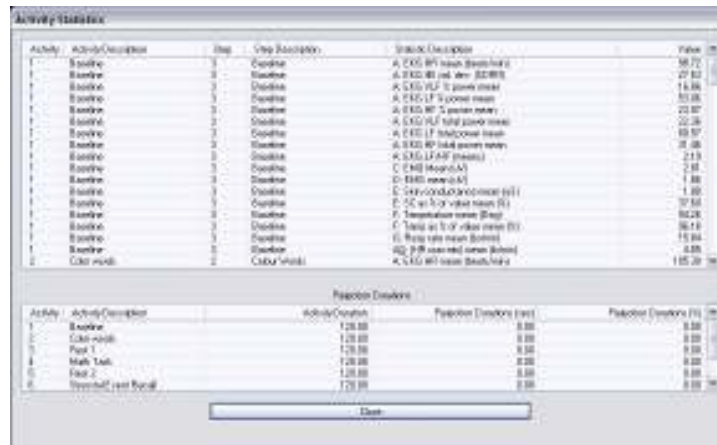
*Important: The Infiniti software uses MS Word templates to generate reports. Microsoft Word **must** be installed on your system for this function to work. Note that this function will not work with Microsoft Works!*

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:

- From the **Database** screen, select a client file and click on **Trend Report.**
- Select the type of session to be trended by clicking on the proper radio button.
- Choose a file name, and on the right side of the table the sessions recorded will be displayed.
- Select the number of sessions to be trended using the **[Shift]** or **[Control]** Key, and then click **OK.**
- In **Select Trend Report**, choose a trend report and click **OK**.
- 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. Be sure to close the Word document before returning to BioGraph; otherwise you won't be able to do any operations.
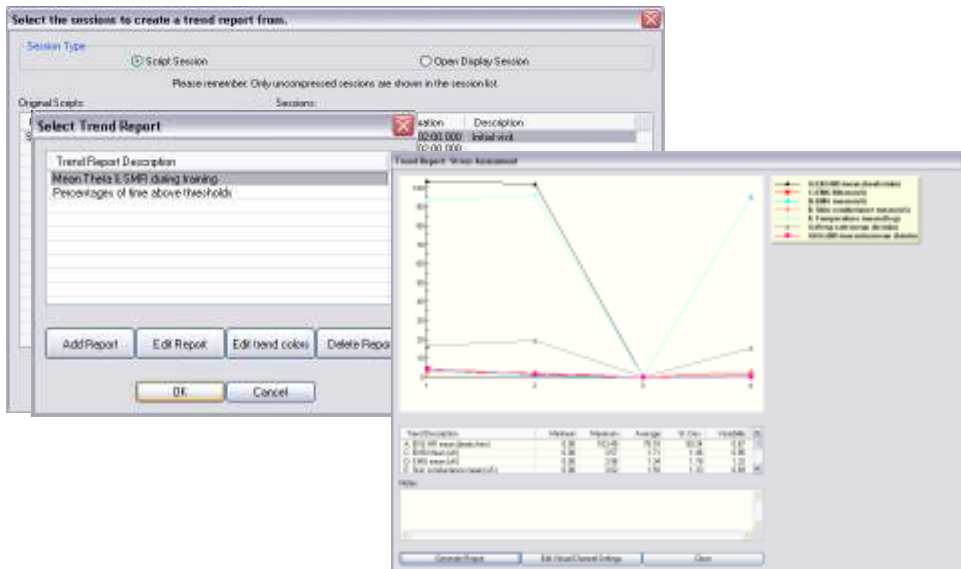
USING A COMPACT FLASH CARD

You can use the MyoTrac Infiniti encoder to record sessions on a Compact Flash Card to be able to download later to the BioGraph Infiniti Software. There is a protective insert in the Compact Flash Slot.

Preparing the Compact Flash for Recording

- First connect a Compact Flash reader to your computer and insert the card in it. Readers come in different sizes and shapes. The picture below is just an example.
- Click on **My Computer** on your computer desktop. You will see a removable disk listed under **Devices with Removable Storage**. This is your Compact Flash card. The drive letter will vary depending on your computer's configuration.
- Select the removable disk and right-click on it.
- From the right-click menu, select **Format**.
- In **Format Removable Disk**, select **FAT** from the File system menu, as shown in the picture below.
- Select the **Quick Format** check box and then click **Start**. This formats your Compact Flash card to the proper format.
- When formatting is finished, click **Close**.
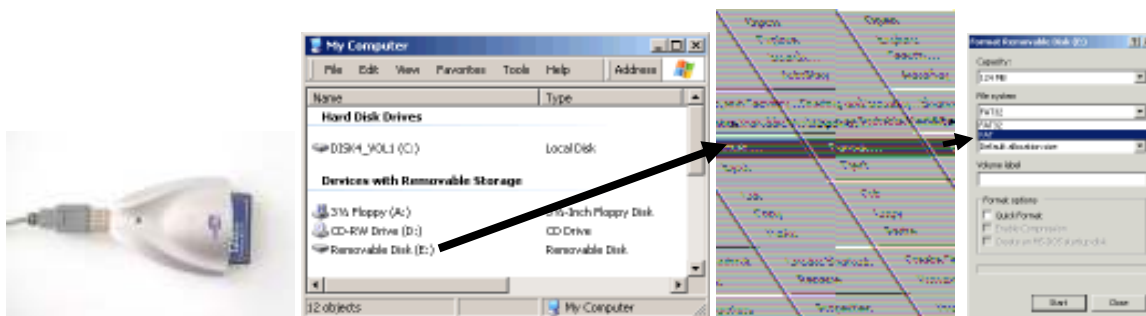
Use this procedure to prepare a FAT-formatted Compact Flash card for use with your MyoTrac Infiniti encoder.

- Insert the formatted card into the Compact Flash reader and connect it to your computer.
- From the **Main Menu** screen of BioGraph, select **Compact Flash Options**, and then click **Rebuild Compact Flash**.
- In the **Rebuild Option**, Select **Create (full rebuild)** and then click **OK**.
- At the warning prompt, click **Yes**.

- Locate the removable disk, which is your Compact Flash, and in the Save browsing window create and save a file type **flash.msf**

The Compact Flash now is ready to be used. This procedure is done once only, and you can't use the Compact Flash for other purposes. Read the MyoTrac Infiniti User's Guide to learn how to record a session.

Downloading a Compact Flash Session
- Insert the formatted card into the Compact Flash reader and connect it to your computer.
- From the **Main Menu** screen of BioGraph, select **Compact Flash Options**, and then click **Download Session**.
- Locate the removable disk, which is your Compact Flash, and in the Open browsing window select the MSF file (with the extension **.msf**).

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, while the mouse is resting on one of the tool bar buttons (see picture of tool bar below).

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 ×l0, 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.

MODIFYING SCREENS WITH SCREEN EDITOR LITE

Display screens can be modified with the Screen Editor Lite program. You can change certain instrument settings, sounds and text without needing to master the full Screen Editor. To learn more about Screen Editor Lite, please refer to the on-line help manual provided by clicking on the *BioGraph Infiniti Docs & Editors* icon, opening Screen Editor Lite, and pressing F1.

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

- In the Script Database window highlight the script you wish to modify.
- Click on **Edit Script Settings** (see picture below).
- Highlight the activity to access the step(s) you wish to change.
- 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: The changes are only saved for that particular session.*

USING A WEBCAM

When you see this logo on a screen in the manual, it means the webcam can be used with this screen. You only need to connect your webcam to your computer and start the session. 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.

We strongly recommend Logitech webcams.

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 "Start DVD but Pause session" option is selected, you can launch a DVD, access the DVD menu and start a movie while the program waits in Pause. When ready, click Pause to start recording data.

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.
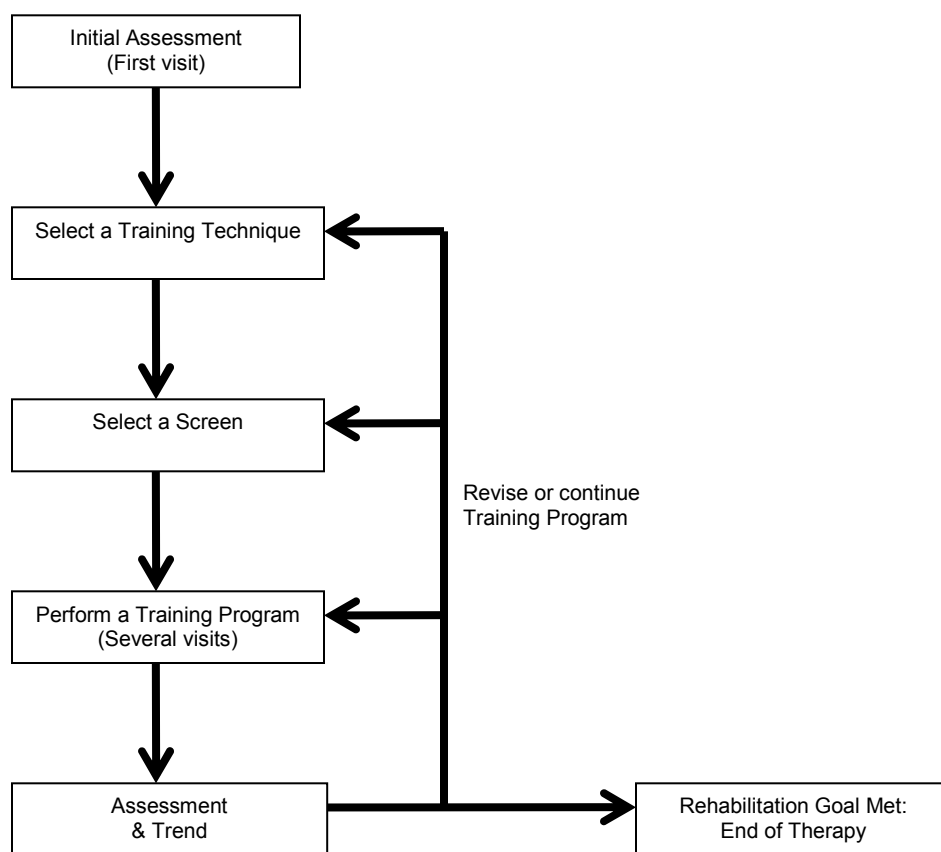
```
          ┌────────────────────────┐
          │   Initial Assessment   │
          │      (First visit)     │
          └───────────┬────────────┘
                      │
                      ▼
          ┌────────────────────────┐◄──────┐
          │ Select a Training Technique │   │
          └───────────┬────────────┘       │
                      │                     │
                      ▼                     │
          ┌────────────────────────┐◄──────┤
          │     Select a Screen    │       │
          └───────────┬────────────┘       │
                      │          Revise or continue
                      │          Training Program
                      ▼                     │
          ┌────────────────────────┐◄──────┤
          │ Perform a Training Program │    │
          │      (Several visits)    │      │
          └───────────┬────────────┘       │
                      │                     │
                      ▼                     │
          ┌────────────────────┐────────────┘   ┌──────────────────────────┐
          │     Assessment     │───────────────►│ Rehabilitation Goal Met: │
          │      & Trend       │                │     End of Therapy       │
          └────────────────────┘                └──────────────────────────┘
```

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 3).

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
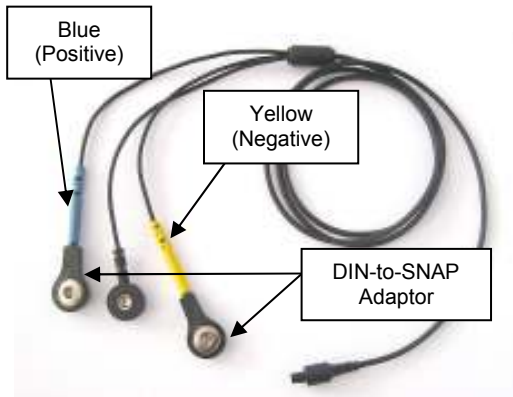
Blue
(Positive)

Yellow
(Negative)

DIN-to-SNAP
Adaptor

In order to use EMG surface electrodes with the extender cable, you must attach the two black DIN-to-Snap adaptors to the pins of the cable, as shown in the picture.

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

Connect the EMG electrodes to the DIN cable, using the adaptors, and connect the cable to one input of the device (see *Setup Of MyoTrac Infiniti™ System*, page 3).

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.

Black
(Reference)

Yellow
(Negative)

Blue
(Positive)
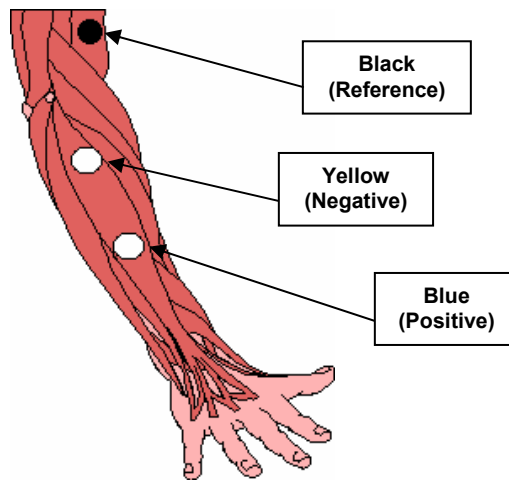
**Example of placement for EMG
(Wrist and Finger Extension)**

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).

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 22).

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 7). 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 8.

You can also compare the two muscles, or report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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.
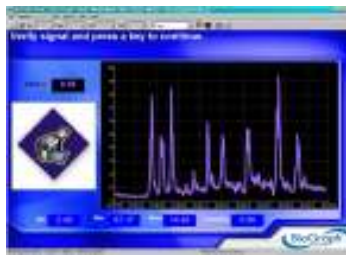
- **Variability** measures the neuromuscular stability. The lower the variability, the more stable the muscle. Since there is no standard value that the variability can be compared to, it is recommended to measure the healthy side and compare both results.
- **Maximum** is the average of the maxima of 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 22). The **mean** can also be used.
- **Area under the Curve** during work period indicates the level of energy produced by the contraction.

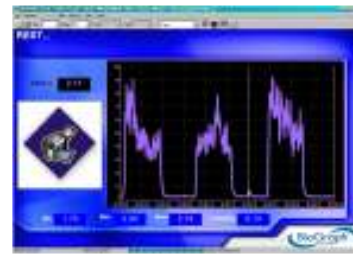The script is divided into 3 steps:

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 7). 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 8.

You can also compare the two muscles, or report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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.
- It also displays the **median frequency** for monitoring the fatigue of the muscle. As the muscle fatigue, the median frequency decreases. The faster it decreases the faster the muscle gets fatigued. For more information about the median frequency, please read your clinical guide, installed on your computer with the other documents (click on the **BioGraph Infiniti Docs & Editors** icon on your desktop).

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.
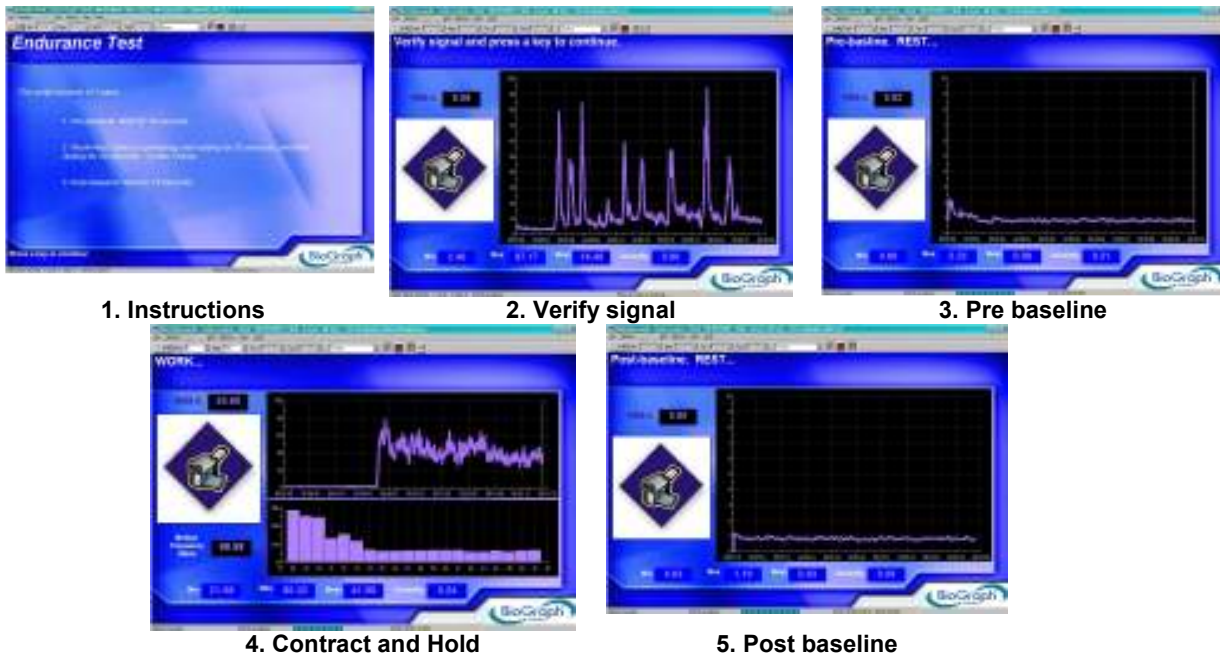
1. Instructions

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 7). 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 8.

You can also compare the two muscles, or report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

ADVANCED PROTOCOLS

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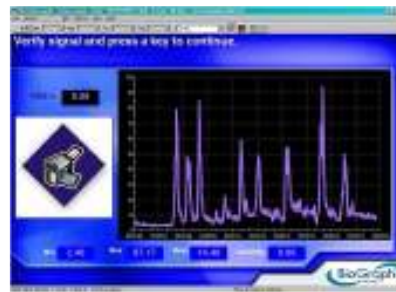
- Statistics: Mean (averaged contraction), variability (neuromuscular stability), area (energy).

Baseline (pre/post): The patient must relax. Comparison of resting levels (pre/post) assesses the ability to recover.
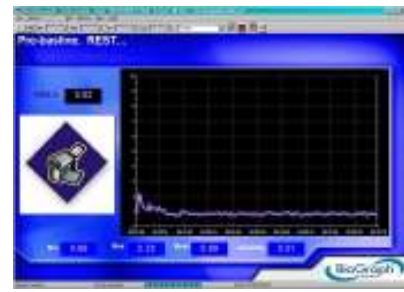
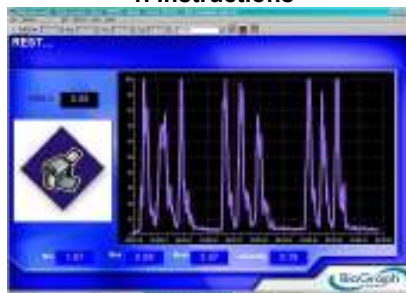- Statistics: Mean and variability (neuromuscular stability).
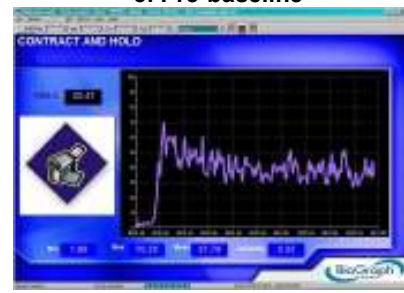

1. Instructions

2. Signal Verification
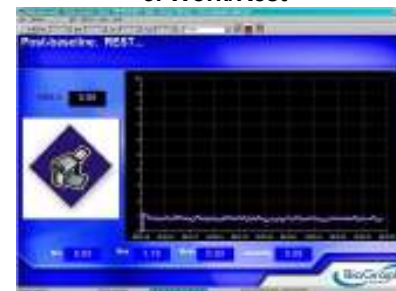

3. Pre-baseline

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 7). 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 8.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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 VC 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 12).
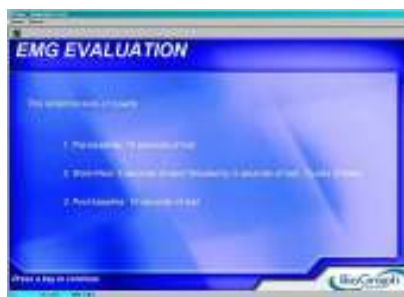
| 1. Instructions | 2. Verify signal | 3. Rest-Work |
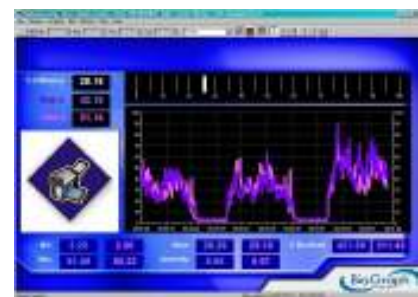
At the end of the session, you can enter session notes (see *Stopping a Session*, page 7). We recommend entering the names of the involved muscles in the description field.

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 8.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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).
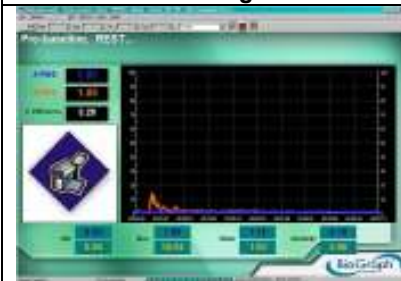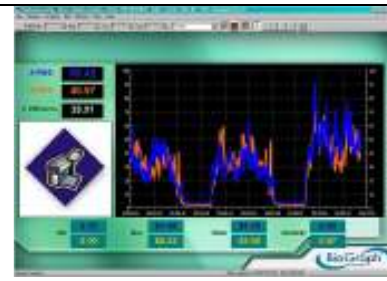
LOW BACK PAIN EVALUATION

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.

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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 12).
5. **Post-baseline:** The patient must stand straight and relax.

Title Page	**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 7).

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 8.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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 12).

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 7).

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 8.
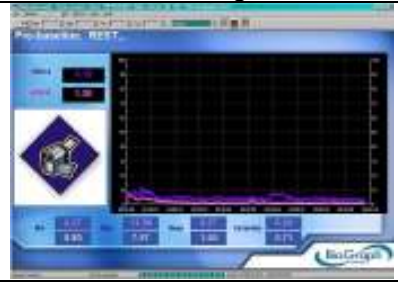
You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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 12).
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 7). 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 8.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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 31). Equilibration refers to bringing muscles into equilibrium.
- **Training - 2Ch Line Graph – Grow Box** and **Training - 2Ch Filled Line Graphs** in *Category: Training* (page 32).

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 reaches 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 25).

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 27).

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 27).

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 Discrimination Training level 1, 2 and 3**, in *CATEGORY: CONTROL* (page 30). **Control - 1Ch Tubes** (page 30) 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 31).

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 31) and in *Category: Training* (page 32).

The screen **Training – 1Ch Motor Copy Training** (see page 32) can also be used as follows:
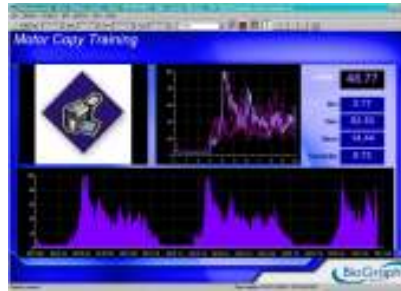
Before starting the session:
1. Place the electrodes on both sites (involved and uninvolved sides) and connect the two cables to the electrodes, but not to the device.
2. Then connect the uninvolved side to channel A.
3. Start the session and ask the patient to perform the movement on the healthy side. 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 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 32).

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 31) and in *Category: Training* (page 32).

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 32), are recommended.
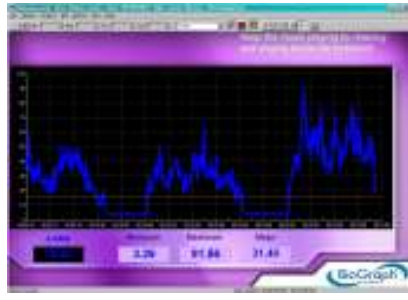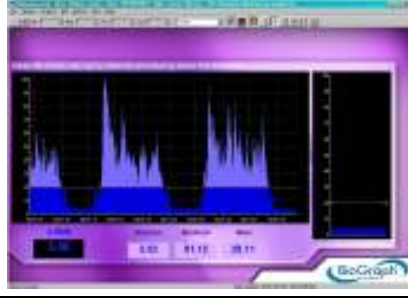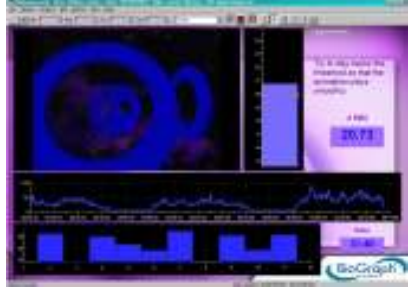
TRAINING SCREENS

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 5 and *Toggling Between Screens*, page 11). 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 11, for more information.

CATEGORY: RELAXATION

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

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.	

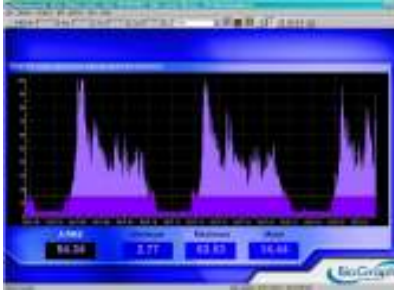|	
Relaxation - 1Ch DVD auto-threshold The channel A signal must stay below the threshold to keep the DVD screen size constant.	
Relaxation - 1Ch Growing Fractal This display assists a patient to differentiate between contracting and relaxing their muscles. Set the animation scale to a maximum value 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 disappear.	
Relaxation - 1Ch Space Hoops auto-threshold The animation moves when the channel A signal is below the threshold. The threshold will automatically move down to push the patient to relax.	
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 auto-threshold Music is played when both channels A and B (bar graphs on the lright) are below the threshold. The two heads must have the same size, which means both signals must be at the same level. Channel B could be connected to the healthy site, in order to use it as a model for the unhealthy site.	

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.

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

Strengthening - 1Ch Bargraph 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 linegraph 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.
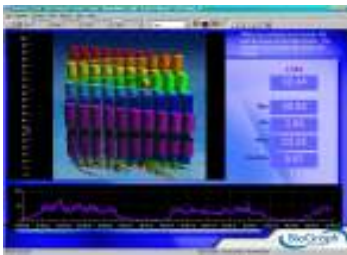
Strengthening - 2Ch Tomato puzzle The signal displayed on channel A must exceed the threshold and channel B must be below the threshold for 5 seconds in order for the puzzle to be revealed. Basic statistics are also displayed to give a more detailed picture.	
Strengthening - 2Ch Hero Morph-slow The animation is 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 about 14 seconds. An audio tone is heard when the signal is above the threshold. If channel B exceeds its threshold 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.

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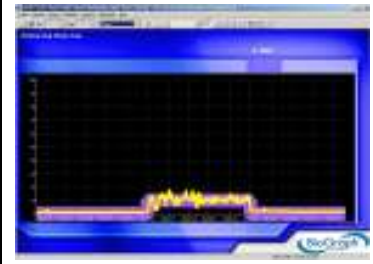
CATEGORY: EQUILIBRATION
These screens are designed for equilibration training. Equilibration refers to bringing muscles into equilibrium.

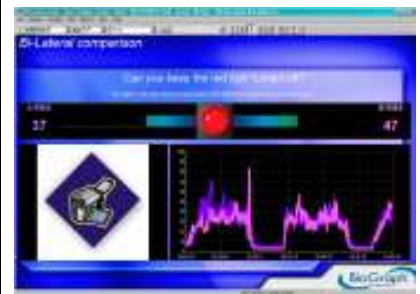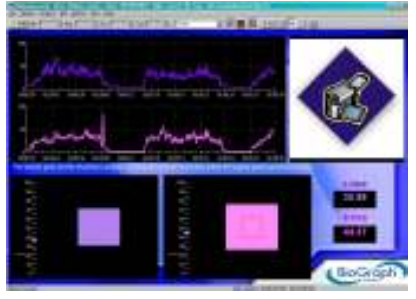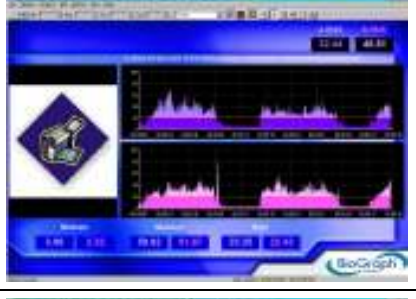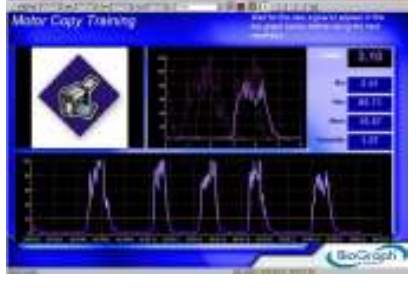|	
Equilibration - 2Ch Balance ratio This two-channel ratio screen easily communicates the interplay of two muscles. When the muscles are in equilibrium, the weight is in the middle of the balance. When the weight is off to one end or the other, the muscles are progressively more out of balance.	
Equilibration - 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.	
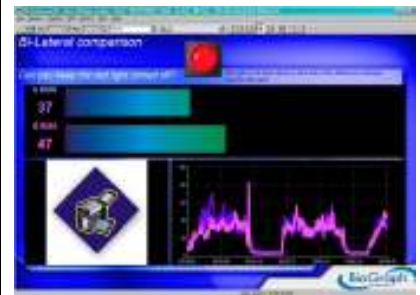
CATEGORY: TRAINING

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

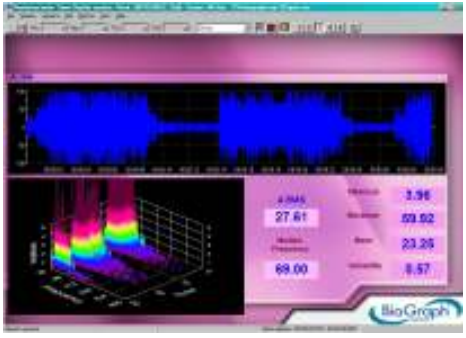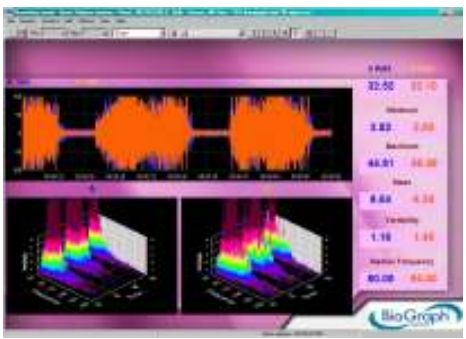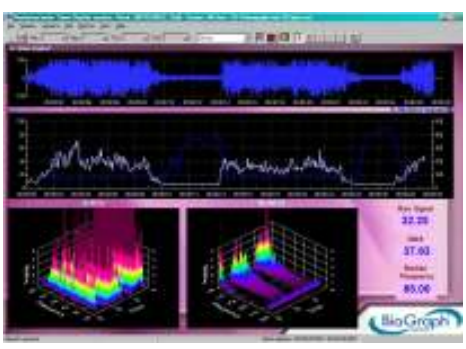|	
Training - 2Ch Line Graph – Grow Box A proportional sound is played when the square expands past the limit (red line). The left square is for channel A and the right square for channel B. The signals are also displayed on a line graph.	
Training - 2Ch Bar Graphs A simple and easy-to-understand display 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 VC 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 8.
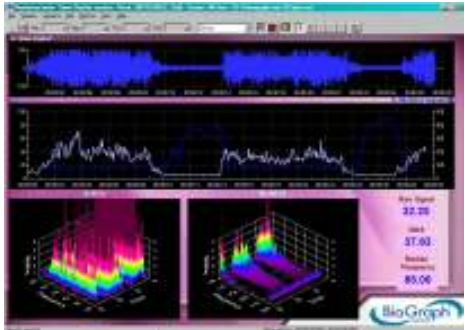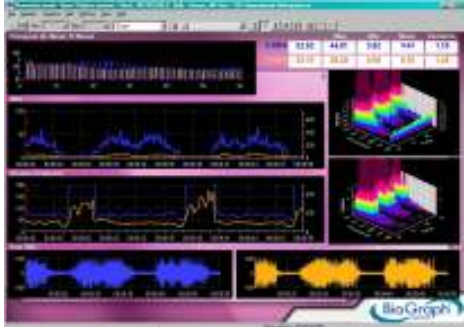

EXPERT SCREENS

These screens use advanced concepts and properties of the EMG signal, such as raw EMG, frequency spectrum and median frequency. You can use them to troubleshoot the system, if you see unexpected waveforms or levels in the signal. You can also use them in review mode to reject artifacts before computing statistics or to perform more advanced assessment. Or you can simply use them to learn more about EMG.

To learn more about EMG, please also read your clinical guide, installed on your computer with the other documents (click on the **BioGraph Infiniti Docs & Editors** icon on your desktop).

To learn how to reject artifacts, please read *Rejecting Artifacts*, page 8.

Expert - 1Ch linegraph raw 3D spectrum This screen graphs the raw EMG and frequency spectrum of channel A, and displays median frequency and statistics.	
Expert - 2Ch linegraph raw 3D spectrum This screen graphs the raw EMG and frequency spectrum of both channel A and B, and displays median frequency and statistics.	
Expert - Ch A linegraph raw 3D spectrum This screen graphs the raw EMG, two frequency spectra, median frequency and RMS EMG for channel A. Median frequency and RMS are displayed on the same screen, because the median frequency is not relevant when the muscle is relaxing. By displaying the RMS EMG, it shows you when the muscle fires. The two spectra show two different frequency ranges. The first one on the left isolates the slow-twitch fibers, and the second one on the right isolates the fast-twitch fibers.	

Expert - Ch B linegraph raw 3D spectrum This screen is the same as the previous one, but for channel B.	
Expert - 2Ch Assessment-Histogram This is for a more involved assessment or review. The histogram displays the mean of channel A every 5 seconds. The first multi-line graph connects to both channels A and B, and the second multi-line graph shows the median frequency. The two single line graphs are the raw signals, and the 3-D spectra show the frequencies from 20 to 500Hz. The numerical displays are the current values and statistics.	

COMPACT FLASH SESSIONS: IMPORT & REVIEW

You can also use your MyoTrac Infiniti stand-alone and record assessment and training sessions on Compact Flash. You can then download the Compact Flash sessions into your software.

To prepare your Compact Flash for recording, please read *Preparing the Compact Flash for Recording*, page 10.

To record a session on the unit, please read the MyoTrac Infiniti User's Guide.

To download the sessions into your software, please read *Downloading a Compact Flash Session*, page 11.

You can then review open display sessions with the screen **Report-Review - 2Ch Compact flash open display session** and scripted sessions with the screen **Report-Review - 2Ch Compact flash script session** 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 8.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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 9) or trend reports (see *Generating Trend Reports*, page 9).

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 3).

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

Snap connector for reference electrode

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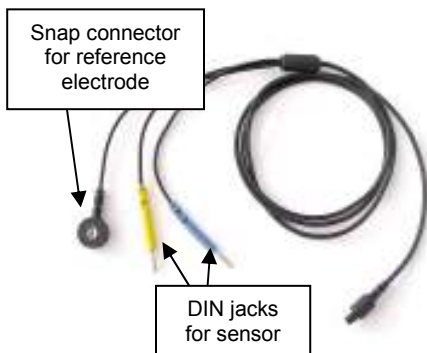
Channel A is dedicated to monitoring the pelvic muscles and requires the use of a vaginal or rectal sensor.

The picture on the left shows the cable required to connect the vaginal/rectal sensor to the device. The two connectors of the sensor connect directly to the DIN jacks (blue and yellow).

The black jack with the snap is connected the reference electrode.

Connect the sensor to the DIN jacks and the surface electrode to the snap, and the cable to the input A of the device (see *Setup Of MyoTrac Infiniti™ System*, page 3).

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

An example of the connections is shown on the right.

CHANNEL B FOR ABDOMINAL MUSCLES

Blue
(Positive)

Yellow
(Negative)

DIN-to-SNAP
Adaptor
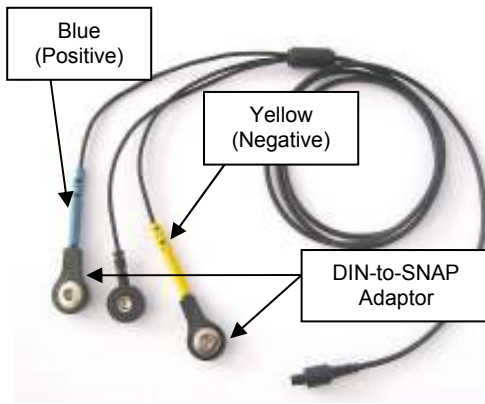
Channel B is dedicated to monitoring the abdominal muscles.

It requires the use of EMG surface electrodes.

In order to use EMG surface electrodes with the extender cable, you must attach the two black adaptors to the pins of the cable, as shown in the picture.

For EMG, 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 DIN cable, using the adaptors, and the cable to input B of the device (see *Setup Of MyoTrac Infiniti™ System*, page 3).

Then place the electrodes on the muscle as illustrated.

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.

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.

Black
(Reference)

Yellow
(Negative)

Blue
(Positive)
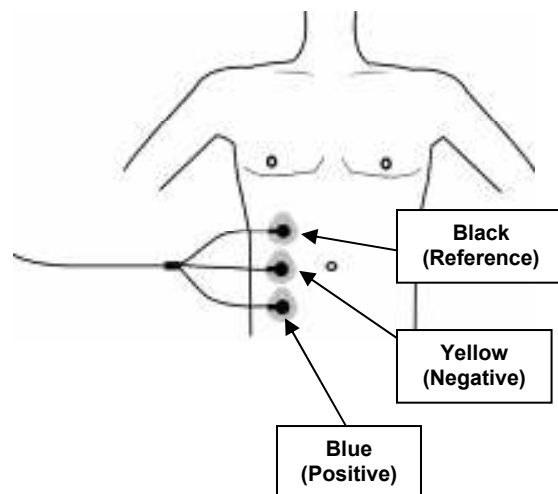
QUICK ASSESSMENT PROTOCOLS (SCRIPTS)

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).

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.
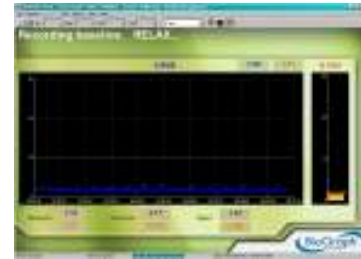
The script is divided into 3 steps:

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 7). We recommend entering the name of the muscle in the description field.

You can then review the session with the screen **R 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 8.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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.

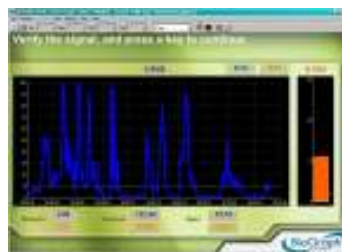This protocol calculates four statistics: variability, mean, maximum and area under the curve.

- **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.
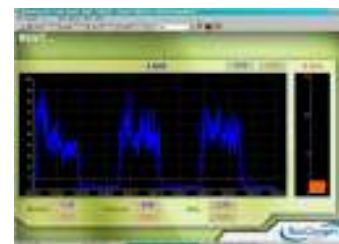
The script is divided into 3 steps:

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 7). We recommend entering the name of the muscle in the description field.

You can then review the session with the screen **R 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 8.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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 **R PMD Assessment 5 Activities** that can be found in the script category **Rehab Suite – Assessment**. This is a basic assessment protocol that allows the clinician an objective measurement of pelvic muscle function and progress.

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 and median frequency for both channels.
2. **Quick contractions**; Divided into 2 steps and repeats 3 times:
    a. **Relax:** Duration is 4 seconds.
    *   Statistics calculated: mean and median frequency for both channels.
    b. **Quick contractions:** Contract quickly 1 to 3 times during 6 seconds.
    *   Statistics calculated: max for A, mean and median frequency 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 and median frequency 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 and median frequency for both channels.
5. **Post Baseline:** Relax muscles to determine new resting levels; duration is 60 seconds.
    *   Statistics calculated: mean and median frequency for both channels.
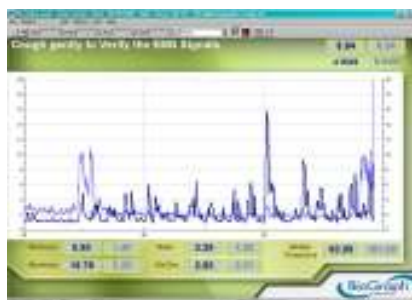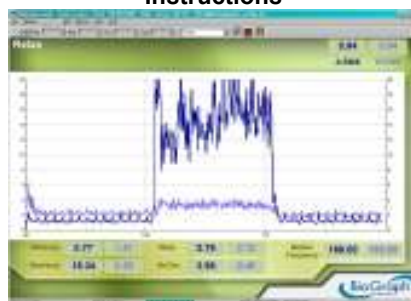

Verify signal
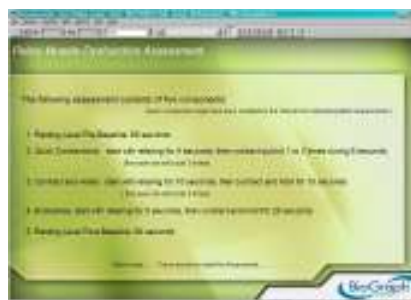
Instructions

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 7).

You can then review the session with the screen **R 2Ch Report Review PMD Assessment 5 Activities** in the category **Rehab Suite – Report-Review** and generate a session report. To learn how to review a session and create a report, please section *Reviewing Sessions*, page 8.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

## PELVIC MUSCLE TRAINING (SCRIPT)

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

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.
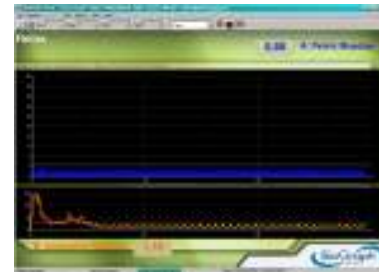3. **Post baseline:** Relax muscles to determine new resting levels; duration is 60 seconds.

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.
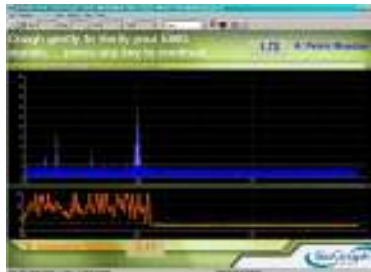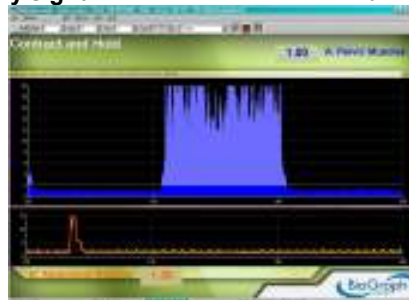

1a. Verify signal

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 7). You can then review the session with the screen **R 2Ch Report-Review PMD 10-10sec 10 cycles** in the category **Rehab Suite – Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 8.

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 11, 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.
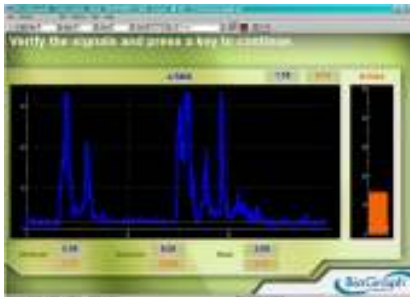
SHORT TRAINING SCRIPTS

These scripts can be found in the script category of **Rehab Suite – Short Template Training**.

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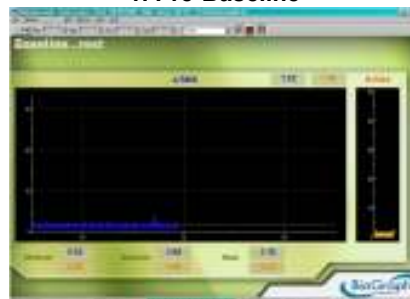

Verify Signal
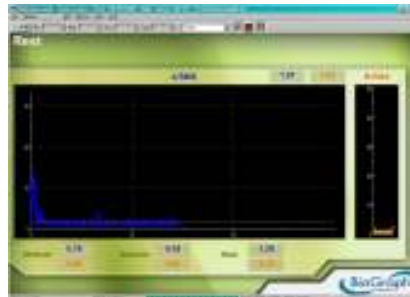
1. Pre-Baseline
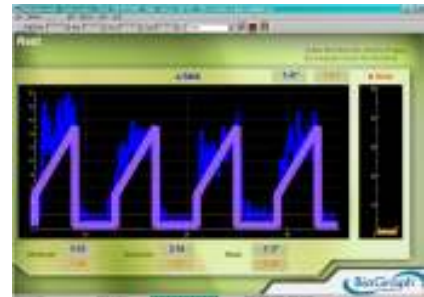
2. Work-Rest

3. Post Baseline

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 **Rehab Suite – Long Template Training**.

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

- R Perineal Control Start-treatment
- R Perineal Control Mid-treatment
- R 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.
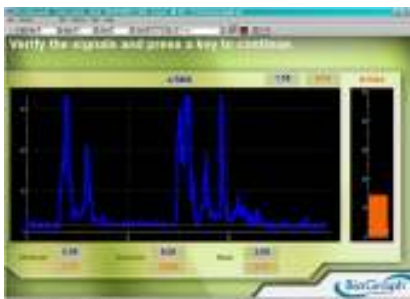
Verify Signal
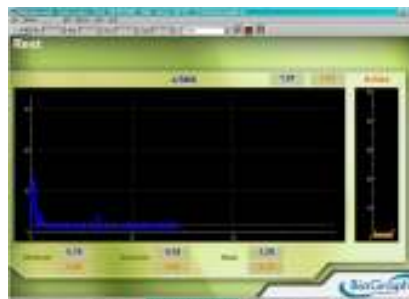
1. Pre-Baseline

2. Template
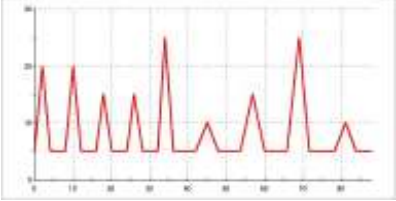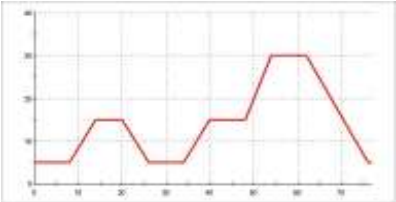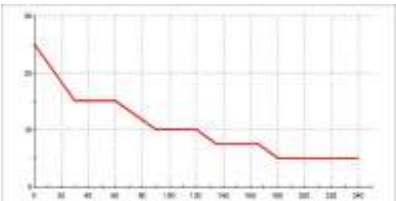

3. Post Baseline

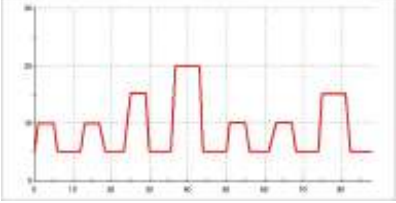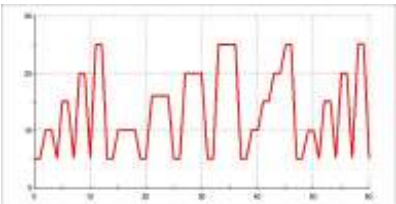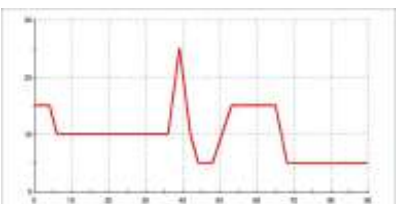## REVIEW AND REPORT

At the end of the session, you can enter session notes (see *Stopping a Session*, page 7).

You can then review the session with the screen **R Report Review – 2Ch Perineal Reeducation** in the category **Rehab Suite – Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 8.

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

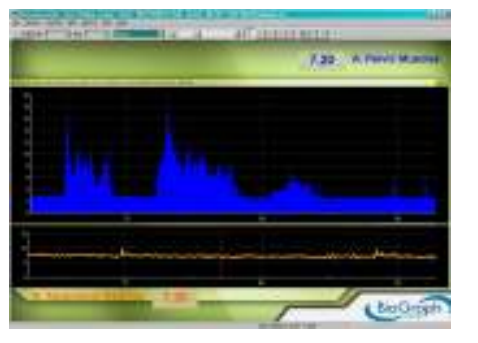|	
	Perineal Control Start-Treatment
	Postpartum Perineal Tonicity
	Relaxation of Perineal Muscles
	Stress Incontinence

OPEN DISPLAY EXERCISES

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

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.

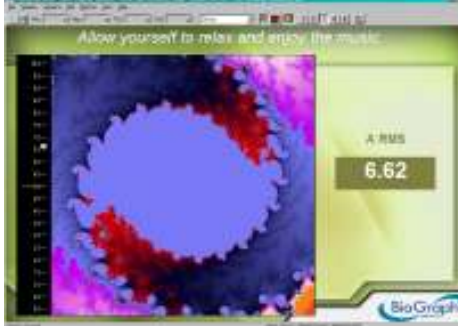|	
R Strengthening - 2Ch Filled linegraph The audio feedback is conditional to both channels of EMG. Music will play when channel A is above its threshold and channel B is below. If B exceeds its threshold the music stops. Also notice the color changes on the graphs as the signal crosses the threshold.	
R 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.	
R 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.	
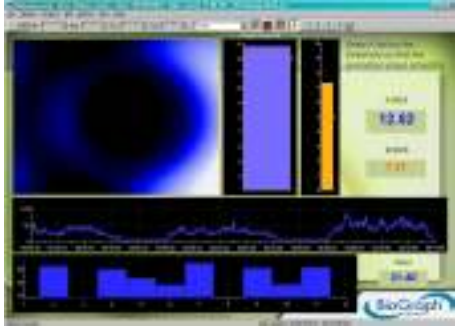
Feedback is initiated when the signal crosses the threshold of the graph or scale displaying that signal. In order for the reward to be effective, the contraction must be sustained above the threshold for a period of time. Therefore, the threshold setting is not a goal in and of itself; the sustained 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 11.

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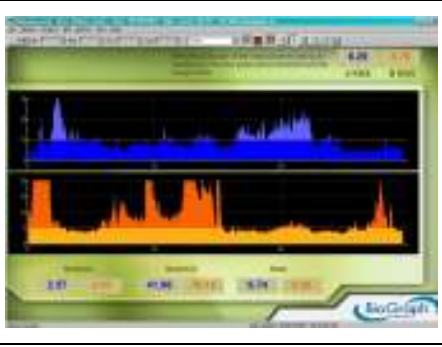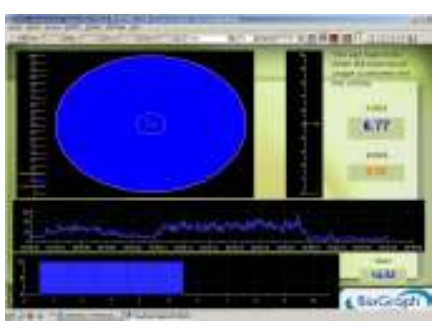
CATEGORY: RELAXATION
The relaxation screens are designed to reinforce lowering levels of EMG activity. The rewards are typically set to encourage EMG activity to fall below its threshold. As the patient releases muscle tension/activity they are rewarded through audio and visual feedback, usually linked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

R 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.*	
R 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.	
R 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.*	

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 *Adjusting Scales and Threshold,* page 11.

R 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 11.	
R Control - 2Ch filled linegraphs 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.	
R 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.	

REVIEW AND REPORT
At the end of the session, you can enter session notes (see *Stopping a Session*, page 7).

You can then review the session with the screen **R Open Display Report-Review** in the category **Rehab Suite – Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 8.

COMPACT FLASH SESSIONS: IMPORT & REVIEW
You can also use your MyoTrac Infiniti stand-alone and record assessment and training sessions on Compact Flash. You can then download the Compact Flash sessions into your software.

To prepare your Compact Flash for recording, please read *Preparing the Compact Flash for Recording*, page 10.

To record a session on the unit, please read the MyoTrac Infiniti User's Guide.

To download the sessions into your software, please read *Downloading a Compact Flash Session*, page 11.

You can then review the session with the screen **R MI UFI Report-Review Compact Flash** in the category **Rehab Suite – Report-Review** and generate a session report. To learn how to review a session and create a report, please read *Reviewing Sessions*, page 8.

You can also report on the patient's progress, by generating a trend report (see *Generating Trend Reports*, page 9).

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