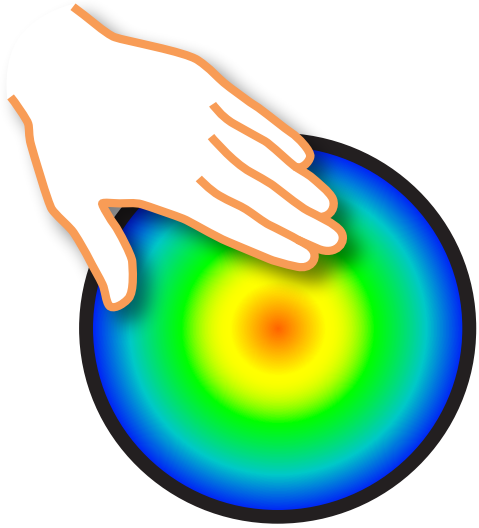
Resistive Measurement System™ (RMS)

DESCRIPTION & TECHNOLOGY

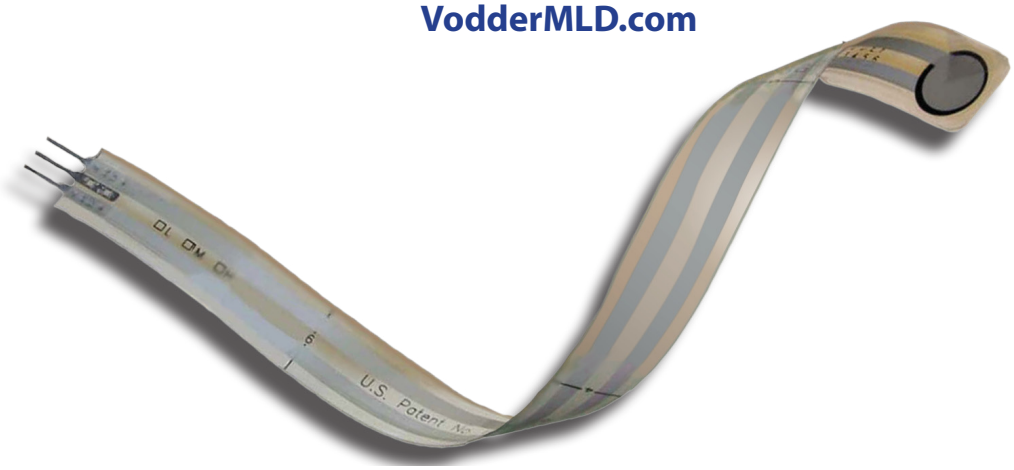
PATENT PENDING

RMS-PTS Pressure Test System™

The only affordable pressure feedback system, measuring and graphically displaying the pressure and time of MLD strokes and the applied pressure of compression garments and bandaging.



VodderMLD.com



Online PTS Description & Technology

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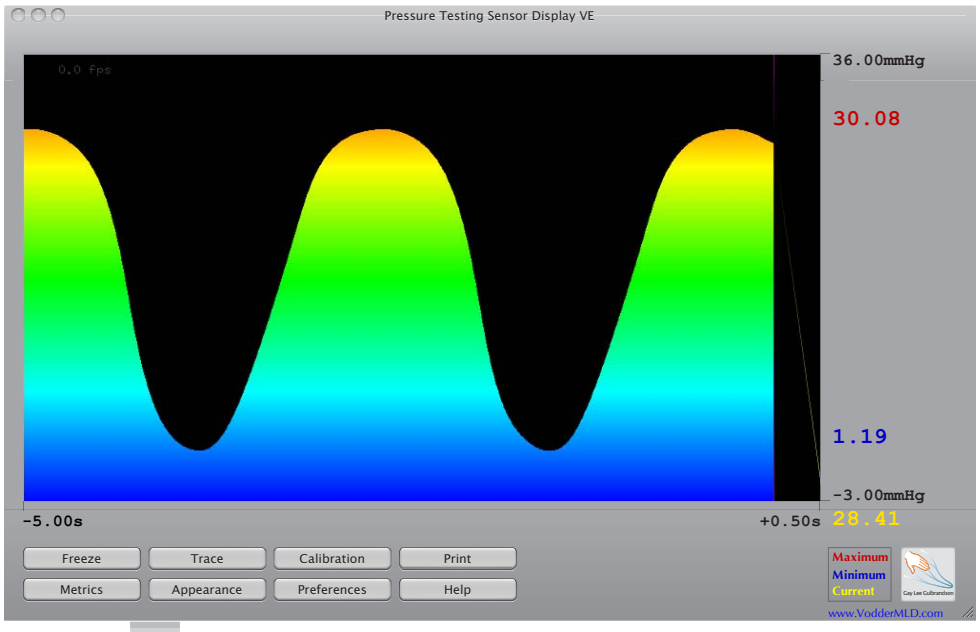
A. PLATFORM / OS: PTS (Kit)

The **PTS** runs on Windows 7 and Macintosh Computers using OSX 10.5 or later. Contact Developer for other applications and adaptations.
This script assumes the user is familiar with basic controls on the Windows or MACINTOSH computer.



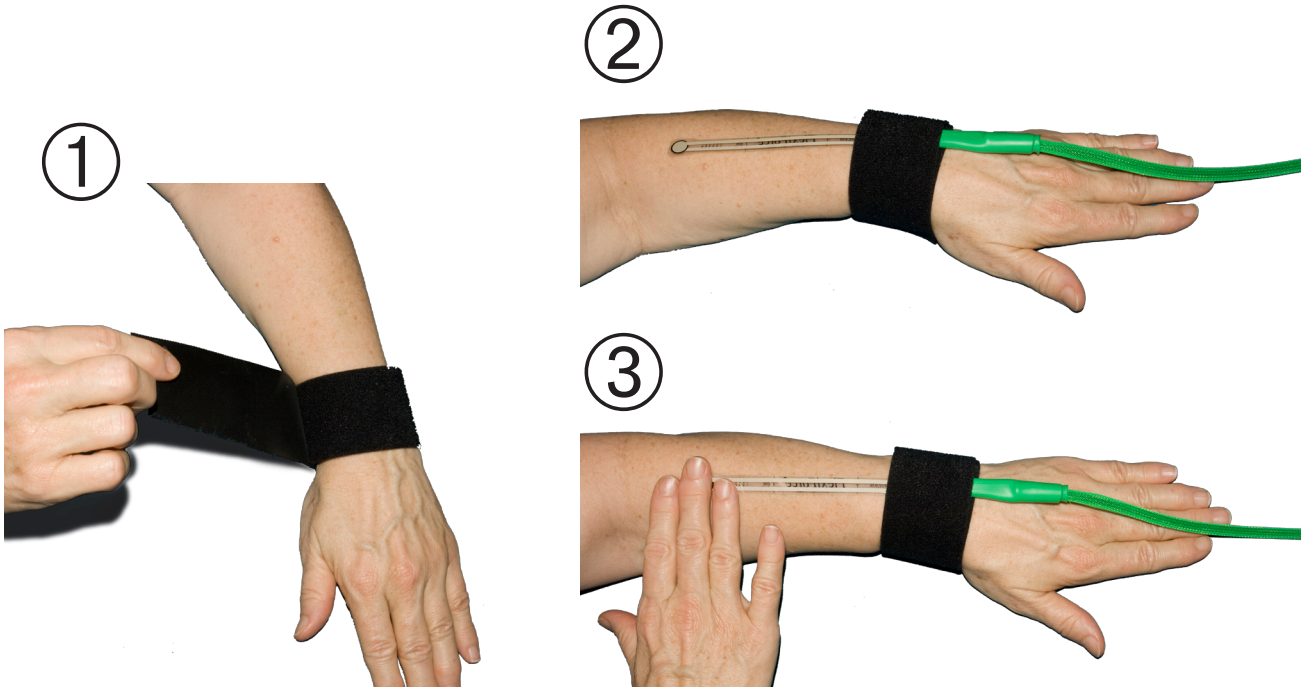
Example of display using **PTS** default settings. Note current numerical value in yellow, peak in red, low in blue digits.

B. How to use the PTS in moments:

To Start: Load the software disc. Open the disc image on the desktop. Drag the appropriate PTS program icon into the Applications folder image alias within the PTS Folder. (Choose Intel or the earlier PowerPC icon depending upon your computer. This info is available in the About this Mac window under the) Now double click the program image you just dragged to Applications. Enter the required registration information and code from the disc.
Next: Plug the wire cable into the MIC and HEADPHONE jacks on your MAC per the instructions, or the USB port.
Next: Perform initial calibration. Click the Calibration button on **PTS** main window and follow the prompts.
Next: The sensor is placed on the limb, held by the wide strap mounting that sticks to itself. Easy to do, even one-handed.
Action: Place finger-tip, finger pad, or palm over the flexible sensor end, and perform an MLD stroke. You may test your own hands, or other people's hands. You may use different fingers or whole hand and may place the sensor anywhere over various parts of the body that are not sharply curved or have bony points. Contact the entire sensing pad tip.
Result: The on-screen trace shows both time and pressure. Adjust screen size by mouse drag on bottom right corner.
Time: The duration of the stroke can be seen across the horizontal axis of the display. **GOAL**: approx 1 second per stroke.
Pressure: The force applied is viewed on the vertical axis of the display. The higher the trace, the greater the force applied. **GOAL:** approx 30 **mmHg** peak on finger-tip, returning to Zero (near bottom of screen) between strokes.
For MLD: The peak pressure for effective MLD is between 30 and 35 **MmHg** (millimeters of mercury). Greater pressure may cause micro-trauma, causing a decrease in lymphatic transport. Maximum reduction in limb volume is dependent upon the exceptionally light pressure of MLD, sufficient time of treatment, appropriate pressure, and the type of edema.
Other Applications and Research: Any digital palpation or measurement (pitting test, etc.) may be standardized, measured, and learned rapidly with the **PTS** sensor system. For compression bandaging pressure verification, for case studies, including pain response to palpation, the **PTS** performs much the same as full glove pressure measurement

systems costing up to $25,000 or more, and makes accuracy and repeatability possible on a low budget.

CONTROL PANELS: The **PTS** system may be used without further adjustment after initial CALIBRATION. All basic adjustments are set at the factory and are initialized by a reset. Following the illustration are short notes on the available adjustments and controls.



Metrics Displays raw signal strength, calibration numbers, time and pressure settings, and more. Two more panels to change units and set sample rate are also here. Any value may be reset by the user.

Calibration Allows system calibration at any time to validate the sensor accuracy. The interface to the Macintosh is set here to make the basic connections. NOTE: 30 **g** centered and covering the sensor pad = 30.969 **mmHg** on the pressure scale. See **CONVERSION VALUES**.

Freeze The display is frozen (stopped) by clicking this button. View, measure, project or discuss the frozen image.

Appearance Select the image color, thickness, gradient, or graph style you prefer. The trace may be modified in almost unlimited ways.

Trace Measures the image any point along the trace, and a digital display of pressure and time are shown according to the position of the cursor.

Print The screen image may be printed or saved on command, with date, time, name, and detailed notes, in color or grayscale, etc.

Preferences The **PTS** Preferences pull-down menu provides program reset, setup choices, and more.

Help The **PTS** Help button and Help pull-down menu has Calibration assistance, access to the online User Manual, and error recovery reset links.

Online User Manual: Accessed from the **PTS** program HELP menu or at VodderMLD.com web site. Installation, functions, controls, calibration, conversion values, full user information, are all explained in detail.

C. VIEWING & UNDERSTANDING THE GRAPH:

To Begin: The sensor is placed on the arm/wrist or leg gently secured by the soft side of the wide mounting strap that sticks to itself. Easy to do, even one-handed. Always use soft side of strap next to skin. Isolate with a tissue or sterile gauze for infection control. Wrap the holding strap once around the limb (for example the wrist) then place the sensor wing shaped bulb (wide spot connection to sensor) on the wrap, and wrap once more over the top of the bulb. Position for comfort and ease of use in any position or location desired, including under a bandage or garment. CAUTION: Only place the flat of sensor under a garment or bandage. Please refer to **HYGIENE & SENSOR** for more on infection control.

Sensor Handling Caution! The sensor is made of durable flexible heavy polyester film with a force sensitive compound (silver/tan disc of 0.375 inch) sealed at the round end. Avoid twisting the sensor excessively or applying excessive stress in any direction. Never fold or crease the sensor. The maximum weight on the standard sensor supplied is 1 pound (453 g.). Greater force will render the sensor unreliable or may damage it.

Removing the Sensor: Complete information on removing the sensor is under topic HYGIENE & SENSOR REPLACEMENT. Do not unplug the sensor from the wire cable unless it has failed. If you must unplug the sensor, grasp the metal pins at the base of the sensor firmly right ON the base, at the socket end. Grasp the connector socket (ONLY) equally firmly. Then pull smoothly straight out. The sensor is a consumable, not covered by warranty, and it is suggested to have a spare available.

Viewing the Screen: The on-screen trace shows both time and pressure. The "wave" or "trace" is the drawn image generated on the display. The oldest, first, or earlier pressure reading is on the LEFT of the display, and the newest or most recent pressure reading is entering from the RIGHT.

Viewing Time of Stroke: The speed of the stroke can be seen across the bottom or horizontal axis (left to right) of the display, measured in seconds. Simply Freeze the screen and view the duration of the stroke from start to finish (time measurement shown at bottom of screen. GOAL for MLD: approx. 1 – 1.5 second per stroke. (Peak pressure of the stroke on the current screen is shown in red digits at right side of **PTS** main display.)

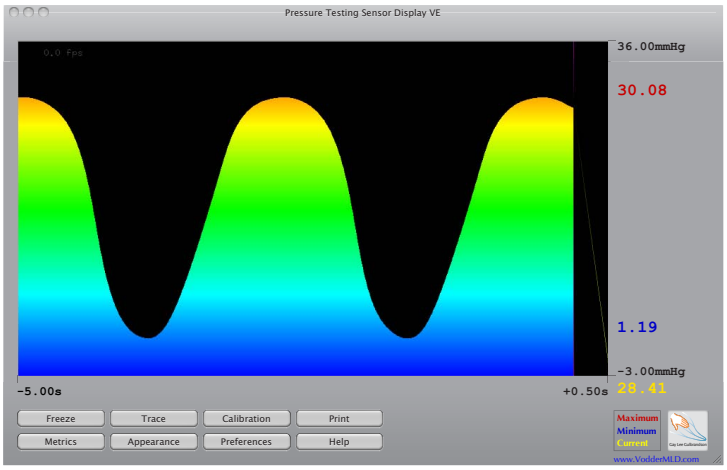
Viewing Pressure of Stroke: The force applied is viewed on the vertical axis (up and down) of the display. The higher the trace, the greater the force applied by the stroke. Simply Freeze the screen and view the pressure of the stroke from start (at the bottom) to peak (the highest vertical point) (pressure measurement shown at right of screen. GOAL for MLD: approx 30 – 35 **mmHg** peak per stroke on a finger-tip/pad, returning to Zero (near bottom of screen) between strokes (end of stroke). Peak or maximum pressure of the visible graph on the current screen is shown in red digits at right side of **PTS** main display, and the minimum pressure of the visible graph shown on the current screen is in blue digits at right side of **PTS** main display. The current instantaneous pressure is shown in yellow digits at right side bottom of **PTS** main display

Standards of Practice for Manual Lymph Drainage (MLD): The peak pressure for effective MLD is between 30 and 35 **mmHg** (millimeters of mercury), returning to zero pressure between strokes. Greater pressure may cause microtrauma to the Initial Lymph Vessels, resulting in a decrease in lymphatic transport. Maximum reduction in limb volume is dependent upon the exceptionally light pressure of MLD, accuracy and quality of the stroke, sufficient time of treatment, appropriate pressure for the tissue condition, and the type of edema.

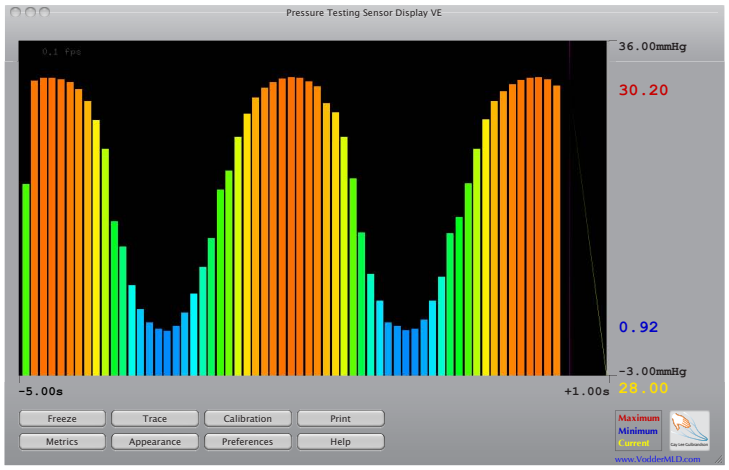
Please see topic **CONVERSION VALUES & STANDARDS: Standards of Practice for MLD**.

NOTE: Most users will not need to perform the adjustments shown in the next section, other than Calibration, Freeze or Print as desired.
The **PTS** is 100% ready to use, as shipped!

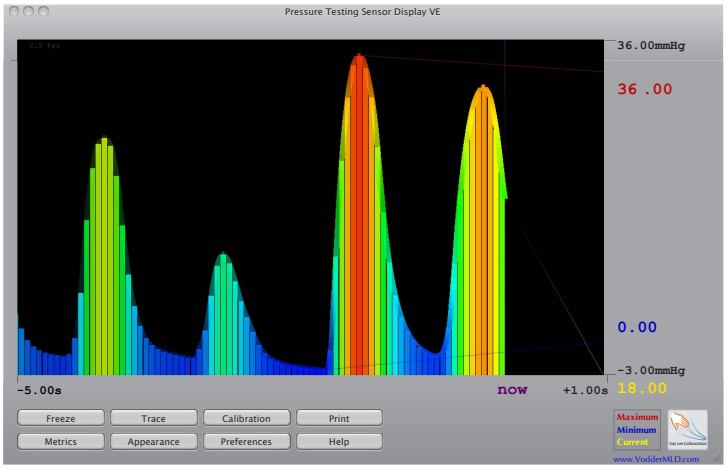
D. SAMPLE TRACES



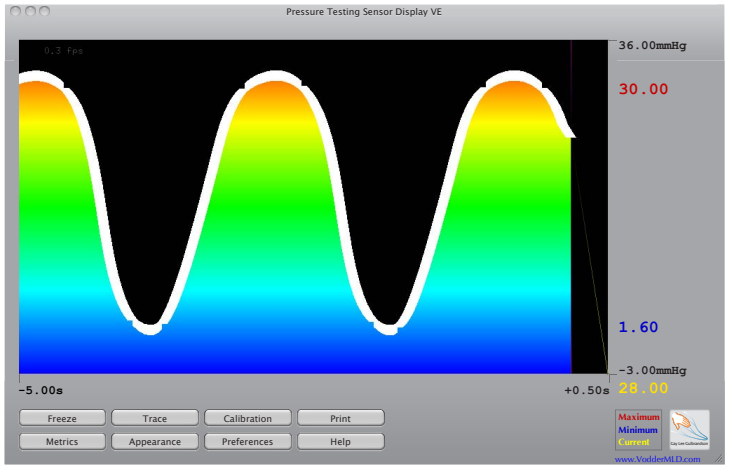
Example A, Good MLD stroke, well rounded.



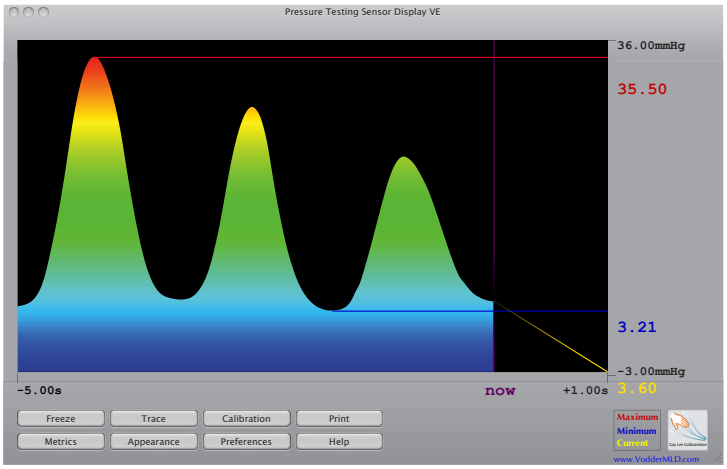
Example B, Appearance settings with Bars and Gradient ON.



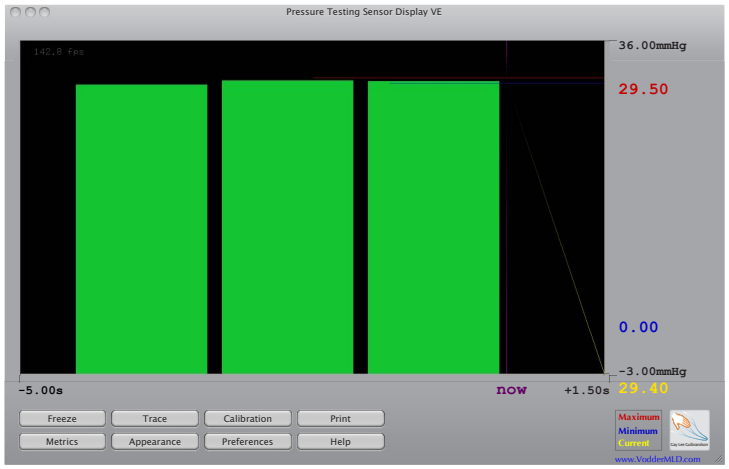
Example C, Uneven MLD pressure, erratic, peaky, rushed.



Example D, Appearance settings with Stroke and Gradient ON.



Example E, Uneven MLD pressure, peaky, rushed.



Example F, Settings for Garment pressure with Bars ON.

Note: All examples above are simulated.

E. ON-SCREEN CONTROLS (Buttons on lower left of main PTS window):

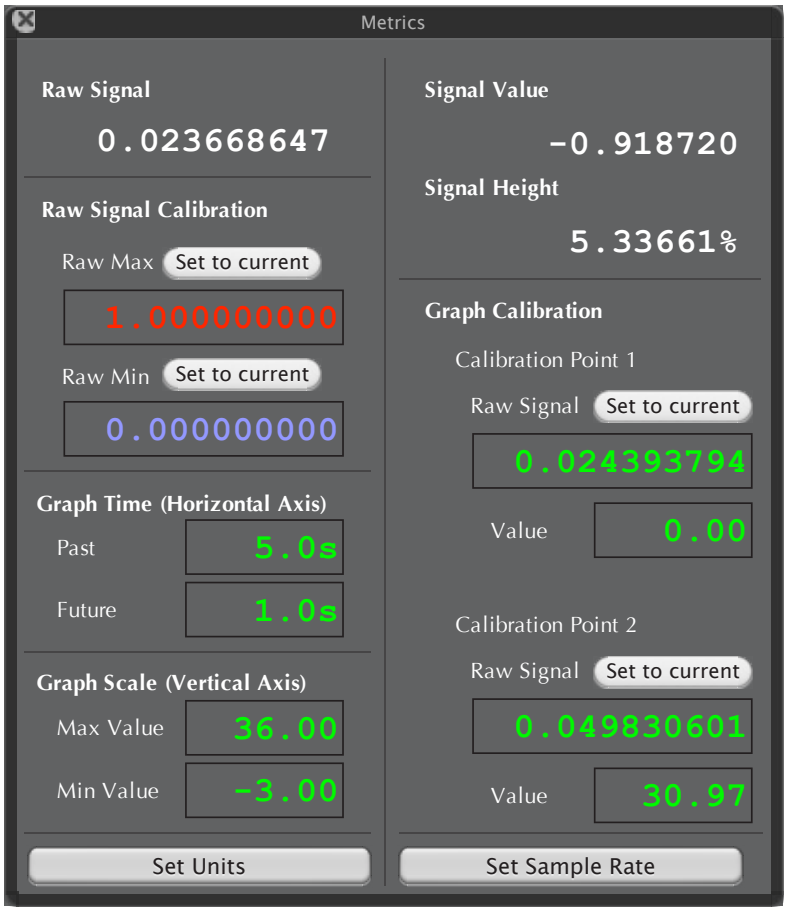
Freeze : The display screen may be frozen (stops drawing the trace) by a mouse click on this

button, or by pressing the SPACE bar. Click Freeze or SPACE bar again to go back to a live image. While FREEZE is on, use the Trace button to examine the graph and the Print button to print it.

Trace: Allows examination of any point on the graph. Move the trace cursor horizontally with the mouse or using the Left ← or Right → arrow keys (arrows may be held down for continuous movement of cursor). The time of the selected point is displayed below the cursor point in purple, and the pressure at the selected point is shown in the yellow field that normally displays the current pressure. Trace can operate without Freeze on, but to make proper use of the Trace measurement function, Freeze the image first. Access the **PTS** Preferences panel to change the cursor movement increment of the Trace function using the Left ← or Right → arrow keys. The default interval is 1% increments. Also accessed via the PTS pull-down menu Preferences.

Calibration: Allows the sensor to be calibrated at any time to confirm the accuracy of the sensor. Do this every 30 - 60 minutes of use, or after a major temperature change occurs. Interface to the MAC OS System Preferences is accessed here to perform basic input and output settings. Calibration during continued usage requires only using page 3. Pressure calibration. (see top of Calibration window). See topic **CALIBRATION** above for complete details.

Print: See next main topic **PRINTING & SAVING a GRAPH** below.



Example of **PTS** Metrics and Appearance control panels. Note sub-panels at bottom of Metrics window.

Metrics: This panel displays the signal from the sensor, the current processed signal, and the current graph height. The editable fields allow adjustment to calibration values as well as the range of

PTS Description & Technology

Time and Pressure shown on the graph. After changing a value, tab to see the effect. When finished, close this control panel or click on the **PTS** main window to achieve the highest screen update rate. If performance is faulty after making changes, you may choose to reset and restart from the **PTS** Preferences menu Reset All Settings and Quit PTS.

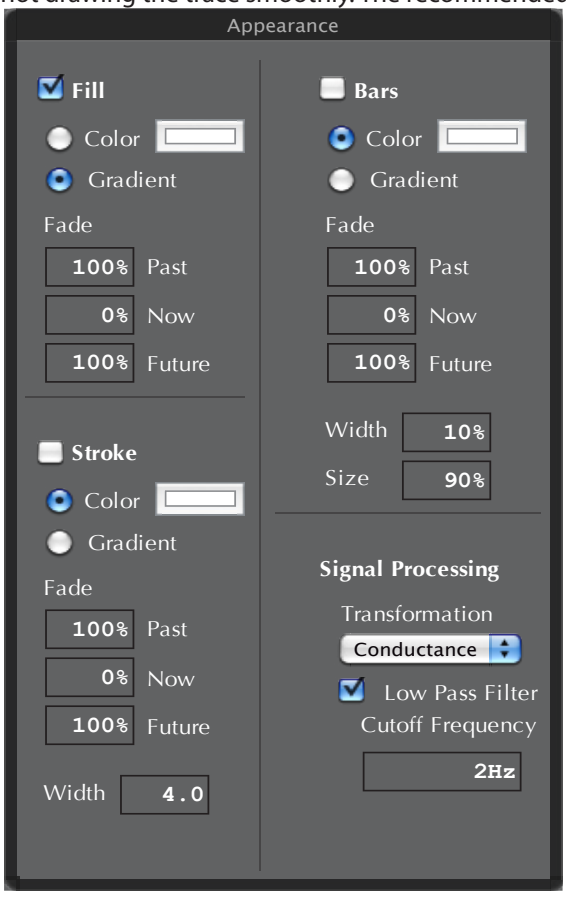
IMPORTANT NOTE REGARDING MEASURING COMPRESSION GARMENTS, BANDAGING, PALPATION AND OTHER USES WITH OTHER PRESSURE TEST or WEIGHT RANGES:

The Metrics control panel provides complete flexibility to measure and display forces up to the capacity of the included sensor (1 lb.) or make use of alternate 25 lb. and 100 lb. sensors.

The Metrics control panel also provides complete flexibility to display traces up to 30 minutes or more depending on sample rate. Rapid single calibration is also available on this screen, as is setting new calibration pressures appropriate to your application. NOTE: To measure WEIGHT instead of pressure, refer to topic CONVERSION VALUES and SENSOR SPECIFICATIONS, or contact **PTS** Developer/ Vendor for guidance.

Set Units panel is opened from the button on the bottom left of the Metrics control panel. To change the pressure units on the **PTS** display enter the new unit name and the conversion factor to the desired new units. For example pounds per square inches (**psi**) and 0.019 are entered here to convert from **mmHg** to **psi**. To effect a change in units BOTH a new units entry and a conversion factor must be entered. See topic O. CONVERSION VALUES for the selected units and values. (Conversion Factor for **mmHg** is 1.0, the standard unit programmed in the **PTS**.)

Set Sample Rate panel is opened here if desired to change the sample rate in the **PTS** processor software. Sample rate changes may be appropriate if your computer is not drawing the trace smoothly. The recommended sample frequency is 100 Hz.

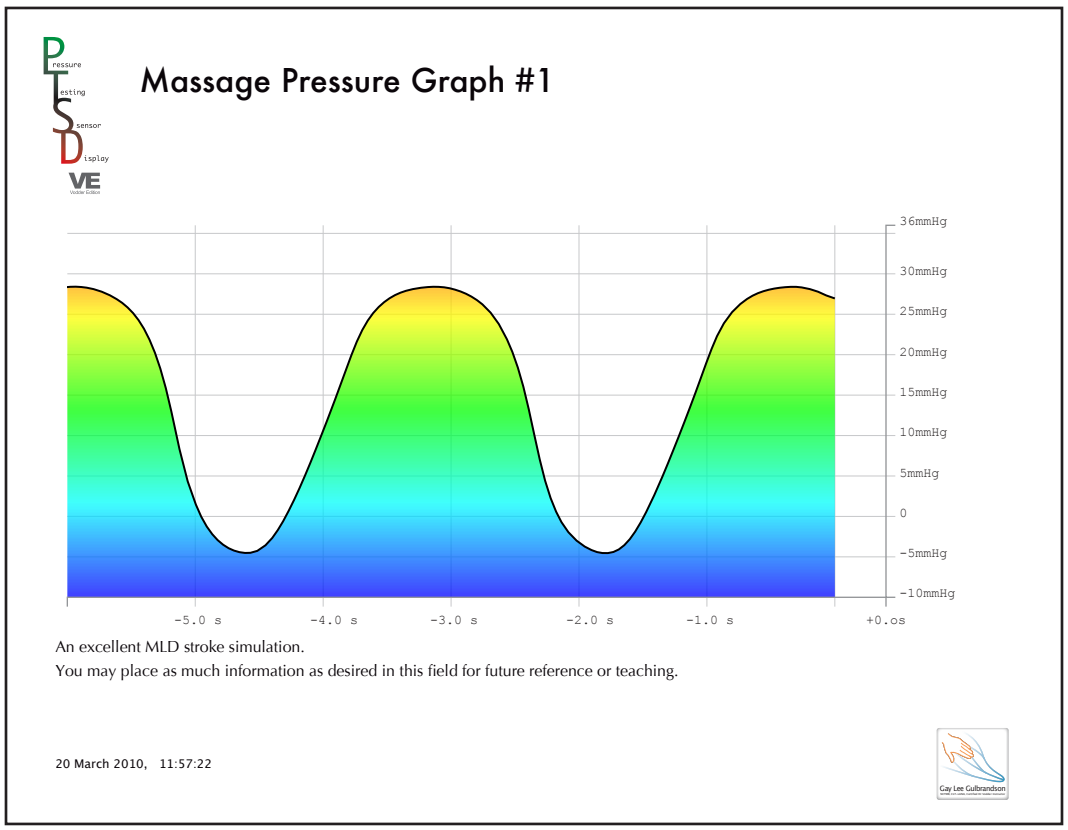


Appearance: The graph viewed on screen may be altered to choose the style you prefer. From a single line of any color or width, to a pressure representative color gradient fill, to a bar graph, the visual configurations are nearly unlimited. Check boxes or change values to adjust colors and form to your liking. After changing a value, you must tab to see the effect. Close this control panel or click on the main **PTS** window to achieve the highest screen update rate. . If performance is faulty after making changes, you may choose to reset and restart from the **PTS** Preferences menu Reset All Settings and Quit PTS.

See "Example of PTS display appearance settings with Bars and Gradient selected" illustration.

Preferences: See topic PREFERENCES below.

Help: The **PTS** Help (and Help pull-down menu) is designed to assist the user when the program is not performing as desired. Help includes a Calibration assistance link to the MAC System Preferences **Sound Control Panel,** and access to the **PTS** Calibration function, access to the current online User Manual, and reset program links in the **PTS** Preferences panel.



Example of **PTS** PRINT output with Gradient selected..

F. PRINTING & SAVING A GRAPH:

Print: The screen image and basic time / pressure scales are printed, with date, time, image title, and user's explanatory notes, (all optional), in full color, black, or grayscale, according to your printer selections.

First, Freeze the image you want to save or print, by clicking on the Freeze button at bottom of the **PTS** main display.

Fill in the TITLE box and if desired the DESCRIPTION (your choice of details). Other options include ability to deselect printing the ☑ Date, ☑ Time, or ☑ Gradient (color filled area below the top trace).

The MACINTOSH File / Page Setup pull-down menu has the appropriate choices as to size of image, paper, color, orientation, paper size, etc.
Choose the top bar File / Page Setup pull-down if desired, at top menu bar under the Print menu heading
Choose the MAC Print Menu PDF pull-down if you desire to SAVE the image or attach to mail, etc.
Choose the MAC Print button if desired, or CANCEL to exit this screen without action.

NOTE: The many custom viewing options available in the Appearance control panel do not function on the Print screen. The images on this page indicate the only 2 printing style choices available.

PTS Reset: A built-in reset function is accessed on the **PTS** Preferences pull-down menu to return all settings to the factory default values. Alternate access to **PTS** Preferences is also via the MAC "Command + comma" when **PTS** is running. See topic PTS PREFERENCES PANEL & RESET.

G. THEORY of OPERATION, USER SAFETY, SYSTEM ACCURACY

How the PTS works: The computer audio Output function is activated by the **PTS** program and sent out through the SPKR / EARPHONE connection plug. This signal is modified (attenuated) by the varying force applied to the sensor disc (resistance response). The modified signal is routed back to the computer via the MICROPHONE / MIC Input connection. The **PTS** software then processes the modified signal to create a visual display (graph or bars) that indicates how much force was applied to the sensor disc over time!

User Safety: It is impossible to receive any shock or electrical sensation from the **PTS** device. The signal is too weak to be felt by a person. If the signal is grounded or shorted, it cannot affect either the computer or a person. However, if shorted or grounded, the **PTS** display will not display correctly, and cannot be calibrated.

Validation: Please refer to the topic SENSOR SPECIFICATIONS for details of the sensor performance and parameters of accuracy. Please refer to the topic INDEPENDENT RESEARCH REPORTS for details and independent opinions of the accuracy of the **PTS** system and sensors.

Obtaining Accurate Measurements: The **PTS** pressure sensor is highly accurate when the entire surface of the sensing area is under pressure. The sensor is not calibrated for nor accurate if any areas of the sensing surface is not contacted by the finger or garment under pressure.

Placements to Avoid: If the sensor is placed over a bony spur of the wrist or an epicondyle, or a brow ridge, angle of jaw, etc., resulting in a sharp bend or if placed over any body part with a sharp curve (a radius of less than 32 **mm**), accuracy is impaired. Therefore, always perform pressure measurements on body surfaces that have gentle curves to achieve full contact with the sensing surface on both sides. The sensing surface has a diameter of 0.375 or 3/8 inch (9.5 **mm**), and is only the colored portion of the sensor end.

Effect of fabric: The **PTS** sensor is highly accurate. This accuracy is not affected by the use of fabrics or bandages on one or both sides of the sensing disc, as long as the entire sensing area is under pressure.

NOTE: If extremely rough or wide fabric weaves are being tested, finer fabric tapes or a puck may be used to distribute the pressure more evenly on the sensing disc.
Please see additional notes on various applications in topic R and S below.

Accuracy calculation and calibration math: Since the sensing pad is 0.375 inches in diameter and the calibration weight is 30 **grams**, the following conversion shows that the placement of this weight fully covering the sensing pad generates a pressure of 31 **mmHg**.
A disc of diameter 0.375 inches has a surface area of

Pi * r^2 = Pi * (0.375 **in.** / 2)^2 = 0.1104 **sq. in.**

Since pressure is force (weight) over surface area, the pressure applied by our calibration weight is

30. **g** / 0.1104 sq. in.

Multiplying by the appropriate unit conversion factors, we get

30. **g** / 0.1104 **sq. in.** = 30. **g** / 0.1104 **sq. in.** * (0.002205 lbs. / 1 **g**) * (51.72 **mmHg** / (1 **lbs.** / sq. in.)) = 31 **mmHg**.

Therefore the 30 **g**. weight accurately applies a pressure of 31 **mmHg** if centered over the sensing pad.
The user can verify the accuracy of the display system by repeatedly applying the calibration weight and observing a consistent display of 31 **mmHg**.
In essence, the system is user-calibrated. Its accuracy is demonstrated during calibration by the repeatability of the display whenever a given pressure is applied, whether it is 30 **g** or any other programmed calibration weight.

H. CONVERSION VALUES & STANDARDS:

Measurement of Pressure and Weight: International standards for this type and range of pressure measurement is millimeters of mercury units (**mmHg**).
The peak pressure of MLD ranges from 30 to 35 **mmHg**, largely dependent on tissue condition and presence of fibrosis. See **Standards of Practice for MLD** just below.

⚠ Some compression garments may apply higher forces. See related information under topics R. and S. below including alternate methods of calibration and other uses.
The force applied by a 30 **g** (gram) weight precisely covering the sensor pad (0.375 inch diameter or 9.5 **mm**) is equivalent to a pressure of 30.97 **mmHg**. The measurement of pressure (evenly applied push irrespective of gravitational force) is accommodated by accounting for the total surface area of the sensing device, and applying a uniform weight calibrated to that known surface area.

Conversion:

30 **g** on the sensor pad	=	30.969 **mmHg**
1 **g** on the sensor pad	=	1.0323 **mmHg**
1 **oz** on the sensor pad	=	29.265 **mmHg**
1 **mmHg**	=	0.96873 **g** on the sensor pad
1 **mmHg**	=	0.034171 **oz** on the sensor pad
1 **mmHg**	=	0.535 240 171 45 **inches of water** [4 °C]
1 **mmHg**	=	0.309 388 445 94 **ounce/square inch**
1 **mmHg**	=	0.0193 **PSI**
1 **mmHg**	=	0.133 322 39 **kilopascal**
1 **kPa***	=	7.506 **mmHg** (***kilo-Pascals**)
1 **mmHg**	=	1.333 223 9 **millibar**
1 **mmHg**	=	13.595 100 264 **Water Column** [**millimeters**]

Measurements are controlled for millimeter of mercury at 32 degrees F [0 °C]

If converting weight to pressure bear in mind that weight is force applied by gravity (irrespective of surface area). Pressure is a force applied uniformly over a given surface area (in this case the sensor pad surface). To use the **PTS** system for weight measurements: **A)** use a "puck" (semi-rigid circular adapter of exact size and configuration as measuring device) of 0.375 inch diameter; **B)** enter weight conversion value and units desired in the Metrics / Set Units panel. See topic **ON-SCREEN CONTROLS** - Metrics entry.

Standards of Practice for Pressure of Manual Lymph Drainage (MLD):
The peak pressure for effective MLD is between 30 and 32 **mmHg** (millimeters of mercury) returning to zero pressure in every stroke. Greater pressure may cause micro-trauma to the Initial Lymph Vessels (ILVs or lymph capillaries) or collectors, resulting in scarring and additional edema, causing a decrease in lymphatic transport. Maximum reduction in lymphedematous limb or trunk or head volume is dependent upon the exceptionally light pressure of MLD, the accuracy, sequence, and quality of the stroke, sufficient time of treatment, appropriate pressure for varying tissue conditions, the type of edema, and adjunct care regimes of CDT (Combined or Complete Decongestive Therapy). Thus the beneficial effects of MLD are achieved by certified MLD therapists with current experience and practice, with the assistance of a **PTS** system.

I. SENSOR SPECIFICATIONS[1]:

The FlexiForce® force sensors use a resistive-based technology. The sensor is manufactured bu Tekscan, Inc. The application of a force to the active sensing area of the sensor results in a change in the resistance of the sensing element in inverse proportion to the force applied. The "active sensing area" is a 0.375" diameter circle at the end of the sensor. The sensors are constructed of two layers of substrate. This substrate is composed of polyester film (PET, for example Mylar®). On each layer, a conductive material (silver) is applied, followed by a layer of pressure-sensitive ink. Adhesive is then used to laminate the two layers of substrate together to form the sensor. The silvery/tan circle on top of the pressure-sensitive ink defines the "active sensing area." Silver extends from the sensing area to the connectors at the other end of the sensor, forming the conductive leads. The sensor acts as a variable resistor in an electrical circuit. When the sensor is unloaded, its resistance is very high (greater than 5 Meg-ohm); when a force is applied to the sensor, the resistance decreases. The maximum safe working force for the standard sensor is 1 pound. Other force ranges are available. See SPECIFICATIONS CHART below.
The entire sensing area of the force sensor is treated as a single contact point. For this reason, the applied load should be distributed evenly across the sensing area to ensure accurate and repeatable force readings. Readings may vary slightly if the load distribution changes over the sensing area.

A201 FlexiForce® SENSOR SPECIFICATION CHART

	Sensor Properties
Thickness	0.008 (0.208 **mm**)
Lengths (Available)	8" (203 **mm**) 6" (152 **mm**) 4" (102 **mm**) 2" (51 **mm**)
Width	0.55" (14 **mm**)
Sensing Area	0.375" (9.53 **mm**) diameter
Connector	3-pin male square pin
	Typical Performance
Force Ranges (Available)	0-1 lb (4.4 N) Available: 0-25 lbs (110 N) 0-100 lbs (440 N)*
Oper. Temperature Range	15°F to 140°F (-9°C to 60°C)
Linearity (Error)	+/- 3%
Repeatability	+/- 2.5% of full scale (conditioned sensor, 80% force applied)
Hysteresis	<4.5% of full scale (conditioned sensor, 80% force applied)
Drift	<5% per logarithmic time scale (constant load of 90% sensor rating)
Response Time	<5 microseconds
Output Change/Degree F	Up to 0.2% (~0.36% / °C). Loads <10 lbs, operating temperature can be increased to 165°F (74°C).

[1] Information and chart above by permission of Teckscan, Inc. publications, manufacturer of the FlexiForce® sensor.

SENSOR LOADING CONSIDERATIONS:

The following general sensor loading guidelines can be applied to most applications, and will help you achieve the most accurate results from your tests. Please read the Conditioning Sensors and SENSOR PERFORMANCE CHARACTERISTICS sections for further information on how to get the most accurate results.

Sensor Loading: The entire sensing area of the sensor is treated as a single contact point. For this reason, the applied load should be distributed evenly across the sensing area to ensure accurate and repeatable force readings. Readings may vary slightly if the load distribution changes over the sensing area.

Note that the sensing area is the silver circle on the top of the sensor only.
It is also important that the sensor be loaded consistently, or in the same way each time.
Adhesives should not be applied to the sensing area; however, if it is necessary, ensure that the adhesive is spread evenly. Otherwise, any high spots may appear as load on the sensor.

PTS EXPERIMENTAL SAMPLE DRIFT TEST CHART: A calibration weight of 30 **g** was applied continuously on a smooth flat surface. Bottom row shows percent of change from original reading.
Your results may vary depending upon test weight, temperature, preconditioning, time interaval, etc.

Start	15 min.	30 min.	45 min.	1 hr	2 hr	3 hr
29.27 **g**	29.44	29.49	29.51	29.52	29.59	29.67
% Change	0.58%	+ 0.75%	+0.84%	+0.85%	+1.17%	+1.45%

Cumulative DRIFT in percent of original test weight is shown below time interval. Tested at 62° F for 3 hours.

J. COMPRESSION GARMENT & BANDAGING TEST APPLICATIONS:

Compression Garments and Bandaging: Spot checking and application tests on lymphedema bandaging, and compression garments may be verified with the single sensor of the **PTS** Kit Basic Kit, or the available selectable sensor array making multiple measurements in a few seconds. The BK2 Basic Kit has two channel real-time measurements for 2 sensor positions at one time. The possible uses are almost endless.

NOTE: PTS does not currently perform automatic data logging functions.

Research and Other Applications: Any digital (finger) palpation or measurement (Pitting test, etc.) may be standardized, measured, or learned rapidly with the **PTS** system. For case studies of all kinds, including palpation / pain response, etc., the **PTS** performs in a smaller area the same task as full hand or glove measurement systems costing up to $25,000 or more. Contact Gay Lee with your proposed use.

NOTE: Sensors with capacities up to 25 pounds and 100 pounds are available. Requires a calibration weight corresponding to the intended use/range for proper calibration, and surface area adapter puck.

Bandage & garment multiple measurements options:

1) Dual-sensor systems - PTS Gold Kit: A pair of sensors (2) (or more) are equipped with quick disconnect wires, easily connected or disconnected to the main wire cable. Additional sensors with the special quick-connect ends may be used in any quantity. The Multi-point, Multi-user system kit (MU1) uses any number of quick-connect sensors. The planned Dual-trace Single-user system Gold kit uses 2 hard-wired sensors and displays them both simultaneously on the same screen. The **PTS** software can be switched between single trace and dual trace for ease of viewing. Only the lower graph may use 

for numerical measurements.

Applications for PTS:

a) When teaching a bandaging class, assign a sensor to each student to place under the wrap. The instructor then tests all the wrapped sensors for desired pressure, quickly moving through the whole class. Simply leave the connector hanging out for an instant reading when ready!

b) To test the pressure of compression garments, new designs or fabrics, multiple sensors are placed under the areas being tested. Individual pressure readings are rapidly made and recorded.

c) When fitting garments or validating garments in use, sensors are placed at the locations of interest and measurements are easily made and shown to the client.

Reference to Standards for Compression Garments (Hoisery):

"There are no national standards for compression hosiery in the USA; the compression classification used most widely is:

Class 1 20-30mmHg;

Class 2 30-40mmHg;

Class 3 40-50mmHg

Class 4 50-60mmHg.

(Hosiery is also available in the USA in a 15-20mmHg pressure range.)

	British standard BS 6612:1985	French standard AFNOR G 30.102	German standard RAL-GZ 387:2000
Testing method	HATRA	IFTH	HOSY
Class I	14–17mmHg	–15mmHg	18–21mmHg
Class II	18–24mmHg	15–20mmHg	23–32mmHg
Class III	25–35mmHg	20–36mmHg	34–46mmHg
Class IV	Not reported	>36mmHg	>49mmHg

Practitioners should be aware that some manufacturers' compression class pressure ranges for lower limb hosiery may be different from the compression class ranges used for upper limb garments. To assist comparison, therefore, garment packaging and studies involving compression garments should state the pressure ranges and the testing method used to determine the pressures."

Source: BEST PRACTICE FOR THE MANAGEMENT OF LYMPHEDEMA © MEP LTD, 2006 ISBN 0-9547669-4-6 Published by Medical Education Partnership (MEP) Ltd 53 Hargrave Road London N19 5SH

Thus the beneficial effects of CDT are achieved by certified MLD therapists with current experience and practice, with the assistance of a compression garment with pressure validated by the **PTS** system.

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ADDITIONAL TECHNICAL INFORMATION IS FOUND IN THE USER MANUAL.