Sonicator® Plus 940

Instruction Manual

METTLER ELECTRONICS® corp.

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IR9–47 Rev. D_07/02/12

FCC Frequency Interference Statement

Warning:
This equipment generates and uses radio frequency energy and, if not installed and operated in strict accordance with the manufacturer's instructions, may cause radio frequency interference.

Notice 1:
This equipment has been verified to comply with the specifications in Part 18 of FCC Rules, which are designed to provide reasonable protection against radio frequency interference. However, there is no guarantee that interference will not occur in a particular installation.

Notice 2:
If this equipment is found to be the source of radio frequency interference, which can be determined by turning the equipment off and on, the user should try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna (as applicable).
- Relocate the Sonicator Plus 940 with respect to the receiver.
- Move the Sonicator Plus 940 away from the receiver.
- Plug the Sonicator Plus 940 into a different outlet than the receiver.
- If necessary, the user should consult with the dealer or manufacturer for additional suggestions. (The user may find FCC's "Interference Handbook" helpful. It is available from the U.S. Government Printing Office, Washington, D.C. 20402, Stock No. 004–000–00450–7.)

Notice 3:
The manufacturer is not responsible for any interference caused by unauthorized modification to this equipment.

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Section 1: Introduction

1.1 Introduction to the Sonicator Plus 940

Thank you for purchasing the Sonicator Plus 940 four-channel combination unit for therapeutic ultrasound and muscle stimulation. The microprocessor controlled Sonicator Plus 940 provides interferential (4-pole), premodulated (2-pole interferential), medium frequency (Russian), EMS, high volt, TENS, microcurrent and direct current (DC) waveforms. In addition the Sonicator Plus 940 offers 1 and 3 MHz ultrasound using a dual frequency 5.5 cm² applicator. An optional 0.9 cm² applicator at 1 and 3 MHz is also available.

The four–channel Sonicator Plus 940 allows you to utilize up to four different waveforms using four channels simultaneously. You can choose between several different amplitude modulation options such as the surge, reciprocation and vector sweep. The interferential and premodulated modes offer frequency modulation as well as a static frequency option.

Figure 1.1— Sonicator Plus 940

The Sonicator Plus provides both a membrane panel and a touch-sensitive screen to allow you to quickly set up treatments. 61 preset treatment setups allow you to quickly set up a treatment that is already in the memory, plus you have room to store up to 80 of your own favorite treatment protocols. In addition, the Sonicator Plus 940 remembers the last treatment that you performed on any stimulation channel or on the ultrasound channel.

The Sonicator Plus 940 can provide electrical stimulation only, ultrasound only and combination therapy with the premodulated, TENS, high voltage, microcurrent and DC waveforms. Add one of the two optional treatment carts to create a mobile therapy center for your office.

The Sonicator Plus 940 has been certified by Intertek Testing Services to meet the requirements for ETL Listing per the following standards:

- UL 60601-1 Standard for Safety Medical Electrical Equipment, Part 1: General Requirements for Safety.

- CAN/CSA C22.2 NO 601.1 – Medical Electrical Equipment – Part 1: General Requirements for Safety
- IEC60601-2-5 – Safety of Ultrasonic Physiotherapy Equipment
- IEC60601-2-10 – Safety of Nerve and Muscle Stimulators

In addition, the Sonicator Plus 940 also meets the following standards for radio frequency emissions and immunity:

- EN 60601-1-2
- CISPR–11

Mettler Electronics Corp. has been certified by VTT Expert Services LTD to be compliant with EN ISO 13485:2003 and MDD 93/42/EEC Annex II requirements. In addition, Mettler is certified by DQS Medizinprodukte GMBH to be compliant with ISO 13485:2003 (CMDCAS) Canadian Medical Device requirements.

1.2 Introduction to This Manual

Read the contents of this manual before treating patients with the Sonicator Plus 940.

This manual has been written to assist you with the safe operation of the Sonicator Plus 940. It is intended for use by the owners and operators of the Sonicator Plus 940. The goal of this manual is to direct the correct operation and maintenance of this unit.

The specifications and instructions presented in this manual are in effect at the time of its publication. These instructions may be updated at any time at the discretion of the manufacturer.

- The operating manual is required for safe use of the unit. If you lend or transfer the unit to another party such as a facility, be sure to provide this manual with the unit.
- Carefully read the Safety Precautions before operating the unit. Follow the precautions given.
- To prevent injury to the operator or patient or property damage, the manual uses the following terms and symbols to represent varying levels of danger. Make sure you understand what these symbols mean before reading the manual.

⚠DANGER Improper handling may result in a high risk of death or serious injury.

⚠WARNING Improper handling may result in a risk of death or serious injury.

⚠CAUTION Improper handling may result in injury or property damage.

Calls attention to Danger, Warning, or Caution items

This particular symbol means "Electric Shock Hazard."

Indicates an action to be avoided.

This particular symbol means: "Do Not Disassemble."

Indicates a mandatory action.

This particular symbol means "Remove the plug from the power outlet."

1.3 Safety Precautions

⚠WARNING

The Sonicator Plus 940 operates with high voltages. Qualified biomedical technicians with training in ultrasound and neuromuscular stimulator service should perform servicing of the Sonicator Plus 940 or it should be returned directly to the factory. To maximize safety during use, the unit should be plugged into a grounded wall outlet. General safety guidelines for medical electronic equipment should be followed.

To assure compliance with FDA, 21 CFR 1050.10 ultrasound standard, the ultrasound portion of the Sonicator Plus 940 should be calibrated and safety tested on an annual basis. This service may be obtained from the manufacturer by sending the Sonicator Plus 940 in its original shipping container to Mettler Electronics Corp., 1333 South Claudina Street, Anaheim, CA 92805, ATTN: Service Department. (Telephone toll free: (800) 854–9305, *Alternate telephone number: 1 (714) 533–2221*) This service may also be performed by qualified biomedical engineers or technicians trained in ultrasound calibration.

NOTE: All warranty repairs must be performed by Mettler Electronics Corp. or by a service facility authorized by Mettler Electronics to perform warranty repair work.

A service manual for the Sonicator Plus 940 is available from Mettler Electronics Corp. for a nominal charge.

1.4 Caution

⚠CAUTION

Federal law restricts the sale of this device to, or on the order of a physician, dentist, veterinarian or any other practitioner licensed by law of the state in which he practices.

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous exposure to ultrasonic energy. Treatment should be administered only under the direct supervision of a health care professional.

The electric energy delivered by this device may possibly be lethal. Treatment should be administered only under the direct supervision of a health care professional. The stimulus delivered by this device may be sufficient to cause electrocution. Electrical current above 25 μC must not flow through the thorax because it may cause a cardiac arrhythmia.

1.5 Shipping Damage

Your new Sonicator Plus 940 is shipped complete in one carton. Upon receipt, please inspect the carton and the unit for visible and hidden damage. If you discover any damage, hold all shipping materials, including the carton, and call the shipping agent who delivered the unit. **They are responsible for all damage in transit; therefore, all claims should be filed directly with them.** The factory will not be responsible for any damage in shipment, nor allow any adjustments unless proper formal claim has been filed by the receiver against the carrier.

The carton in which your new Sonicator Plus 940 was received is specially designed to protect the unit during shipping. **Please retain all shipping materials in the event that you will need to return your unit for servicing.** NOTE: All warranty repairs are to be performed by Mettler Electronics Corp. or an authorized Mettler Electronics warranty repair center.

1.6 Package Contents

Your new Sonicator Plus 940 comes complete with all the necessary components to perform therapeutic ultrasound, neuromuscular electrical stimulation and combination therapy. Below is a list of items that are included in the shipping carton.

1. Sonicator Plus 940
2. Large ultrasound applicator, ~5.5 cm² at 1 and 3 MHz, (ME 9401)
3. Sonigel, ultrasound couplant gel, one sample tube, 100 ml, (ME 1846)
4. Four electrode cable sets, (ME 2266)
5. One package V Trodes, 2" diameter (ME 2702))
6. Two 4"x 4" sponge electrodes, (ME2002)
7. Two pin to banana adapters, (ME 2027)
8. Detachable U.L. listed, hospital–grade line cord
9. Instruction Manual on a CD ROM and Warranty Card

1.7 Limited Warranty

The Sonicator Plus 940 combination unit for neuromuscular electrical stimulation and therapeutic ultrasound is warranted against defects in materials and workmanship for a period of two years from date of purchase. . The Sonicator Plus 940 applicator is warranted against defects in materials and workmanship for a period of one year from date of purchase. During the applicable warranty period Mettler Electronics Corp. will, at its discretion, either repair or replace the Product without charge for these types of defects.

For service under this warranty, the Product must be returned by the buyer within the applicable warranty period to Mettler Electronics Corp. **Shipping charges to Mettler Electronics Corp. under this warranty must be paid by the buyer. The buyer must also include a copy of the sales receipt or other proof of the date of purchase. If the Product is returned without proof of the date of purchase, it will be serviced as an out–of–warranty product at Mettler Electronics Corp.'s prevailing service rates.**

Alteration, misuse, or neglect of the Product voids this warranty. Except as specifically set forth above, Mettler Electronics Corp. makes no warranties, express or implied, including without limitation any implied warranty of merchantability or fitness for a particular purpose, with respect to the Product. If any implied warranties apply as a matter of law, they are limited in duration to one year.

Mettler Electronics Corp. shall not be liable for any indirect, special, consequential or incidental damages resulting from any defect in or use of the Product.

Any legal action brought by the buyer relating to this warranty must be commenced within one year from the date any claim arises and must be brought only in the state or federal courts located in Orange County, California.

Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to the buyer. This warranty gives the buyer specific legal rights, and the buyer may also have other rights which vary from state to state.

Section 2—Symbol Glossary, Control Descriptions and List of Abbreviations

2.1 Symbol Glossary

Increase intensity button

Decrease intensity button

"Hold" treatment button pauses treatment for all active channels and ultrasound but retains set treatment parameters and remaining treatment time. Adjust intensity to resume treatment.

Stop treatment button stops all output and resets all treatment parameters to their default settings.

Set time and time display, minutes and seconds

Increase parameter value control

Decrease parameter value control

Select a preset protocol

Load a preset protocol

Save a treatment protocol

Free program slot

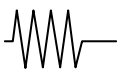
There are no electrodes connected to the patient or there is not a completed circuit

Channel

4-Pole Interferential

2-Pole Interferential (Premodulated)

Electrical Muscle Stimulation



Russian

TENS

High Voltage

 Direct Current (DC)

 Ultrasound treatment

 Combination treatment

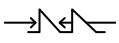
 Carrier frequency for 4-pole and 2-pole interferential and EMS

 Beat frequency for 4-pole and 2-pole interferential and EMS

 Duty cycle for Russian mode

 Set pulse width

 Set twin pulse width for high voltage

 Set individual pulse width for high voltage

 Positive polarity

 Negative polarity

 Bipolar

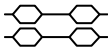
 Vector sweep mode

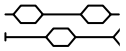
 Continuous mode

 Burst mode

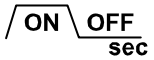
 Frequency modulation mode

 Surge mode

 Surge mode, 2 channels

 Reciprocation (Alternate) mode

 Frequency sweep range

 Set on / off times

 Using gel for ultrasound treatment

 Using cream for ultrasound treatment

 Large (~5.5 cm²) ultrasound applicator plugged in.

 Small (0.9 cm²) ultrasound applicator plugged in.

w/cm² Watts per square centimeter selected for intensity display.

w Watts selected for intensity display.

 Select ultrasound frequency (1 or 3 MHz)

 Select ultrasound duty cycle (5, 10, 20, 30, 40, 50 or 100%)

 Mains On.

Mains Off.

Attention, consult instruction manual.

Diagram of Pulsed Mode duty cycles

Type BF Equipment—Class I

Non–ionizing radiation

IPX7 Protected against the effects of immersion.

ETL and C–ETL Listed

2.2 Control Descriptions

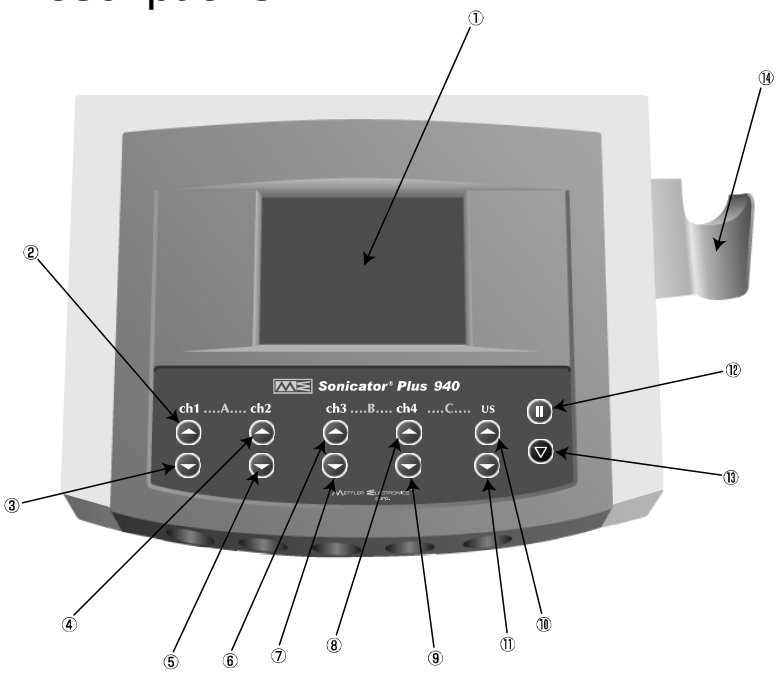


Figure 2.1— Sonicator Plus 940, top view

1. Touch-screen LCD
2. CH1 intensity UP control
3. CH1 intensity DOWN control
4. CH2 intensity UP control
5. CH2 intensity DOWN control
6. CH3 intensity UP control
7. CH3 intensity DOWN control
8. CH4 intensity UP control
9. CH4 intensity DOWN control
10. Ultrasound intensity UP control
11. Ultrasound intensity DOWN control
12. Pause control
13. Stop control
14. Ultrasound applicator cradle

2.3 List of Abbreviations

cm^2	—	Square centimeters
Hz	—	Hertz (pulses per second)
LCD	—	Liquid crystal display
LED	—	Light Emitting Diode
MHz	—	Megahertz (1×10^6 cycles per second)
µs	—	Microsecond (1×10^{-6} second)
mA	—	Milliampere (1×10^{-3} ampere)
ms	—	Millisecond (1×10^{-3} second)
min	—	Minutes
sec	—	Seconds
S/N	—	Serial Number
W	—	Watts
W/cm^2	—	Watts per square centimeter

Section 3—Installation

3.1 Installation Instructions

⚠CAUTION

1. When installing the unit, pay attention to the following:
   - Install the unit beyond the reach of possible water splashes.
   - Install the unit where it will not be adversely affected by atmospheric pressure, temperature, humidity, sunlight, dust, ventilation, salt air, sulfur, or other such harmful substances.
   - Protect the unit against instability, vibration, or impact (including during transportation).
   - Do not leave the unit in locations with combustible airborne materials such as combustible anesthetic gases mixed with oxygen, nitrogen suboxide and air, or combustible disinfecting agents or cleaning agents mixed with air.
   - Do not install the unit where chemical products are stored or where gases may be emitted.
   - To avoid accidents due to distortion of the main unit and accessories, keep the unit away from flames or fire.
   - If operated near something that emits loud noises, the unit may fail or operate inconsistently. Take appropriate precautionary measures, such as moving the product a safe distance from such noise sources.
2. The Sonicator Plus 940 may be susceptible to interference originating from shortwave diathermy units operating in close proximity to it. Avoid operating the Sonicator Plus 940 adjacent to and simultaneously with operating shortwave devices.
3. Connect the line cord to the back of the Sonicator Plus 940. (See Figure 3.1) Make sure that the power switch is in the Off position.
4. Grasp the plug of the line cord (ME 9403) and insert it into a grounded wall outlet that is rated between 100–240 VAC, 50/60 Hz. Your power supply must match the voltage requirements listed on the serial number label of your device. **Do not connect the** Sonicator Plus 940 **to a power supply rated differently than that described above.**
5. The line cord comes equipped with a standard 3–prong plug. This plug provides grounding for the Sonicator Plus 940. Do not defeat its purpose by using 3–to–2 prong adapters or any other means of attaching to a wall outlet.
6. Line up the key at the top applicator cable connector with the slot on the round receptacle located on the front of the Sonicator Plus 940. (See Figure 3.2) The side with the arrow on it is up so you can see it.
7. Place the applicator onto the applicator cradle. (See Figure 3.3)
8. Plug the electrode cables (ME 2266) into the electrode cable connections as seen in Figure 3.2. Each cable has an arrow on it. Place the arrow facing up and then press into the connector. For combination therapy procedures, plug the electrode cable with the "4" into the electrode connection for Channel 4. Each cable is marked with a number indicating which channel to plug in the cable.
9. **Do not use sharp objects to operate the membrane panel switches or touch screen.** If the tough outer layer of the membrane is broken, moisture may leak into the switches resulting in switch failure. Using objects other than finger tips may damage the screen.
10. Once you have verified proper functioning of your Sonicator Plus 940, using the instructions in Section 4, please fill in the enclosed self–addressed Warranty Registration Card and mail it to Mettler Electronics.

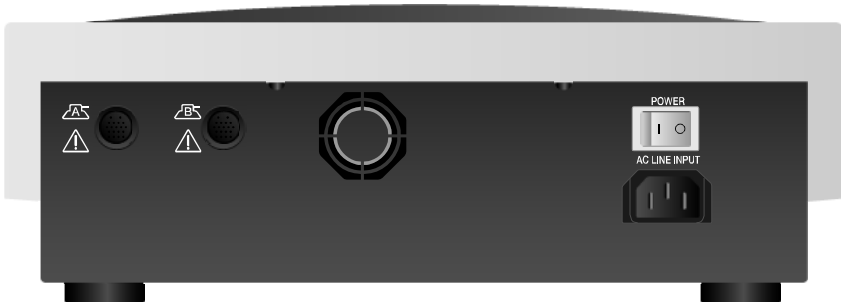


Figure 3.1— Sonicator Plus 940, Back View—
Mains Power Switch and Line Cord Connection

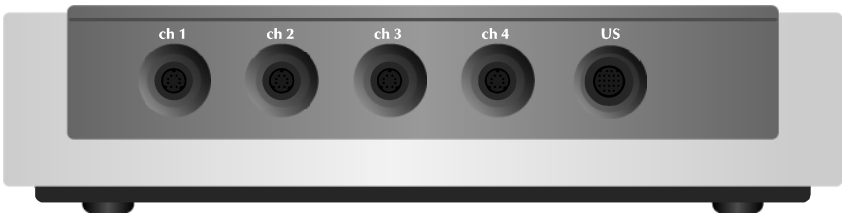
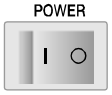


Figure 3.2— Sonicator Plus 940, Front View—
Electrode Cable and Ultrasound Applicator Connections

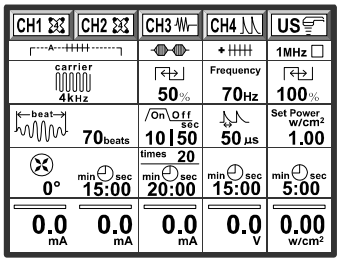
Figure 3.3—Sonicator 940 with ultrasound applicator cradle

3.2 Customizing the Optional Settings

The Sonicator Plus 940 has a number of options that the user can set to regulate the volume of the buzzer and determine the lighting of the LCD screen. This section will guide you through the process.

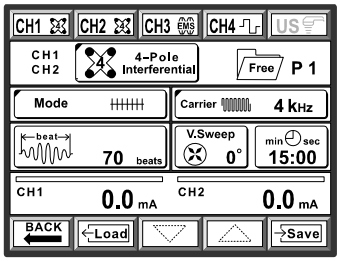


1. Turn on the mains power switch by pressing "**I**" icon on switch.



2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

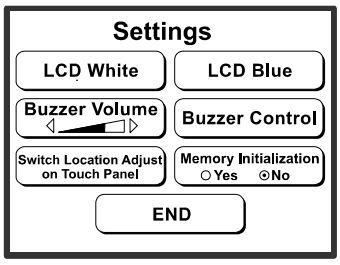
3. Press any one of the channel selectors.



4. You will then see the setup for that channel.

5. Press the "Save" button on the touch screen panel.

6. On the next screen press the "Settings" button.



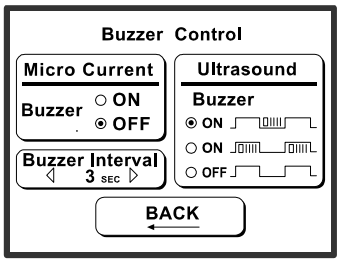
7. You will then see the "Settings" screen. After you are done with setting the various options you will always press "End" and the Sonicator Plus 940 will save your changes to memory so that the next time you turn on the unit it will remember your custom settings.

8. To set the background color of the LCD to white with blue letters, press the "LCD White" button on the touch screen panel.

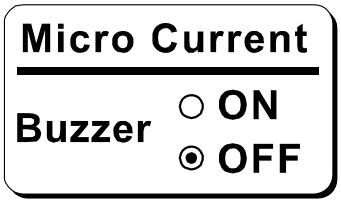
9. To set the background color of the LCD to blue with white letters, press the "LCD Blue" button on the touch screen panel.

10. There are four different settings for the buzzer volume. Press "Buzzer Volume" on the touch screen panel to adjust the volume or turn off the buzzer.

11. The Buzzer Control" button gets you to the menu that sets specific buzzer traits for microcurrent, ultrasound and how often you will hear the buzzer during non-coupling conditions for ultrasound treatments.

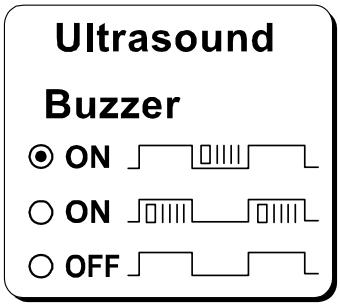


12. This is the menu that will show for all buzzer functions. You will press "Back" to return to the Settings menu.



13. With the Sonicator Plus 940 in its current configuration, the microcurrent buzzer should be turned off.

14. The buzzer interval setting increases or decreases the time between double beeps for ultrasound and microcurrent treatments.



15. The "Ultrasound Buzzer" controls when the double beeps occur during a treatment as follows:
    - On only when coupling is lost.
    - On when the applicator is coupled to the patient
    - Off—Never on.

16. Pressing the "Back" key returns you to the "Settings" menu.

17. Pressing this key automatically adjusts the touch sensor in the touch screen to fit your needs. Cross marks appears in the upper left corner, then the upper right corner and finally in the lower right corner. Press them as they are displayed. If no indication appears, touch each cross mark. Once adjustment is complete, you will be returned to the "Settings" menu.

18. If you press yes on the "Memory Initialization" screen the unit will cycle off and restore all Settings to factory-set values.

19. Pressing "End" will save the changes you have made into memory. You will be returned to the starting menu once this process is complete.

Section 4—Operating Instructions

Figure 4.1—Membrane panel and touch-sensitive screen

4.1 A Note about Electrodes

To ensure safe operation of the Sonicator Plus 940, follow the recommendations listed below:

1. We strongly encourage careful maintenance of the electrode system. This includes the lead wires as well as the pads themselves. Worn cables and/or poor pads (or the wrong sized pads) can have a significant impact upon treatment results.
2. Do not exceed the number of recommended uses listed on the instructions for V Trodes or other reusable self–adhesive electrodes.
3. Make sure that the entire surface of the electrode is contacting the patient.
4. Do not use moist hot packs to secure electrodes.
5. To avoid skin irritation due to high current density, do not use electrodes smaller in surface area than the 2" in diameter V Trode self-adhesive electrode (ME 2702).
6. Do not use conductive carbon electrodes with this product.
7. Do not use self-adhesive electrodes with the Direct Current mode. Use sponge type electrodes with plain tap water moistening the sponges.
8. Whenever clinically possible, utilize the largest possible pads to reduce local increases in current density. In situations where small pads are required, use the lowest stimulation intensity necessary to achieve the desired clinical results.

The table below illustrates the relationship between electrode diameter and current density. As you can see the current density increases rapidly when diameter decreases.

Diameter *inches*	Surface Area *Square inches*	Current Density *mA/sq in (for 10mA)*
1.25	1.2	8.2
2.00	3.1	3.2
3.00	7.1	1.4

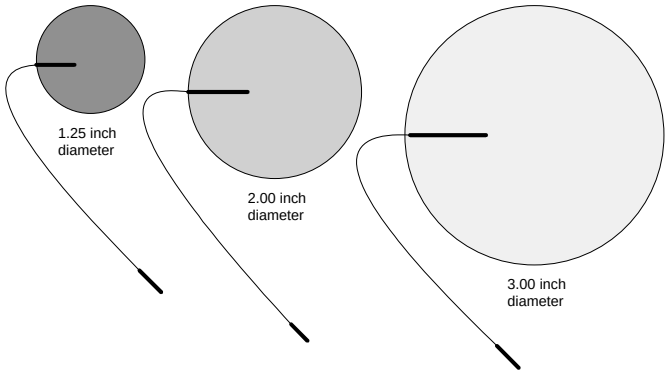


Figure 4.2—Electrode Sizes and Current Density

4.2 General Operating Instructions:

Before you start.

a) Review precautions, contraindications and side effects/adverse reactions listed in Section 5.

b) Use Mettler Electronics electrodes to ensure safe and effective operation.

c) Verify connection of the line cord to a grounded wall receptacle and the Sonicator Plus 940.

d) For ultrasound and combination therapy make sure that the applicator is securely connected to the Sonicator Plus 940.

e) For combination therapy, make sure the electrode cable marked with a "4" is attached to electrode cable connection for Channel 4. Plug your dispersive electrode into the red-tipped lead wire marked "combo". The black tipped lead wire is not connected to anything.

f) For electrical stimulation, connect electrode cables (ME 2266) into the electrode connections for the channels that are going to be used. The cables are marked with numbers indicating the channel they should be plugged into. There is an arrow on the top of the connector which always faces up when you plug in the cable.

g) For waveforms that have polarity such as DC, microcurrent and high voltage, the black-tipped electrode cable with the black stripe on the cable is negative. The side with the red-tipped lead wire with no black stripe is positive.

h) The Sonicator Plus 940 will retain in memory the last treatment performed on any stimulation channel or on ultrasound.

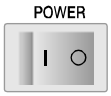
i) When the output current remains below the setting for a certain period of time, the setting may be automatically lowered. Check whether the electrodes are properly attached before using the Sonicator Plus 940.

j) The unit performs an operation corresponding to the button pressed first. If another button is pressed while one button is still depressed, the first operation continues. Release the first button, and then press the button you want to activate next.

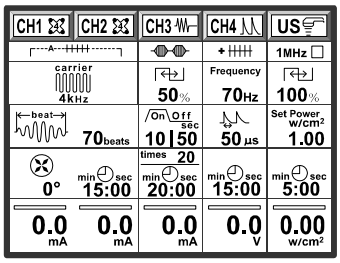
k) Confirm that the attached electrodes are not touching before starting a treatment. If you attempt to turn up the output when electrodes are too close or touching, the intensity will not go up and the timer will not start. As soon as the problem is corrected, the Sonicator Plus 940 will begin to respond to the intensity control button.

l) Note: Descriptions of the symbols used on controls are in Section 2.

4.3 Quick Set-up for Electrical Stimulation

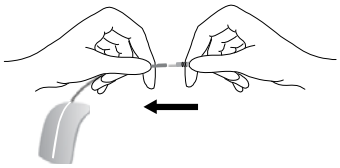


1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.

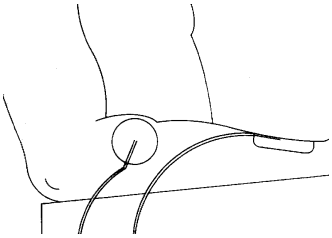


2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

3. If you wish to use one of the starting electrical stimulation protocols, plug the electrode cable into the channel corresponding to the channel that you want to use on the display.



4. Plug the cable into the electrode.



5. Stick the electrodes on the patient. You will need two electrodes for each channel.

6. Adjust the intensity and start treatment for the stimulation channel that you are using by pressing the "Up" arrow on the control panel.

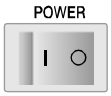
! OPEN ERROR

7. If you attempt to adjust the intensity of a channel with no electrodes stuck on the patient you will get an "Open Error". You will also get this message if the electrode cable is broken or the electrode is not making good contact with the patient.

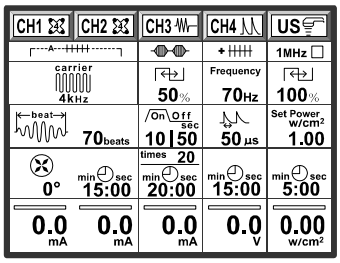
8. To clear an error press the red "Stop" key and the channels will reset. You can then correct the error and restart the treatment. Pressing this button will also reset <u>all</u> treatment parameters to their default values, so you will need to reprogram any programs that are different from the default settings.

9. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

4.4 Quick Set-up for Therapeutic Ultrasound

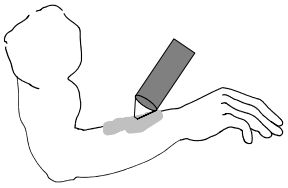


1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.

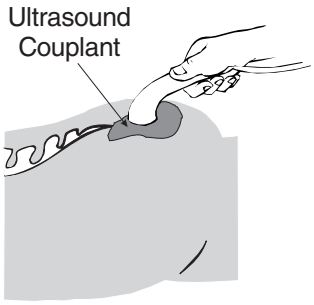


2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

3. For ultrasound, plug the ultrasound applicator into the receptacle labeled "US".



4. Apply a layer of ultrasound couplant gel to the treatment area. Select whether Gel (GEL) or another topical product (OTM) is being used as a couplant.



5. Couple the applicator to the treatment area by keeping the entire surface of the applicator in contact with the gel that has been applied to the patient. This will ensure an efficient delivery of therapeutic ultrasound to the patient. Green LEDs on either side of the applicator will light when coupling is achieved.

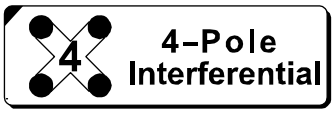
6. Adjust the intensity level for the ultrasound.

7. If you hear an intermittent beeping sound or the indicator light on the applicator goes out, there is inadequate coupling to the patient. Reapply gel and treatment will resume again when coupling is established.

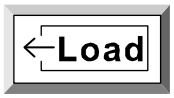
8. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

4.5 Using Preset Programs

1. Pick the channel that you want to use by pressing the touch screen.

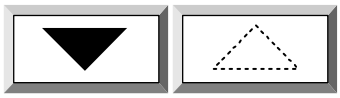


2. Pick the waveform that you wish to use. *Please note: the preset programs for each of the waveforms and ultrasound are listed below for your convenience.*



3. Press the "Load" button. You will see "Load Preset Program" or "Load Free Program" at the top of the screen.

4. Select either to load "Preset" or user-defined "Free" protocols by pressing the option on the touch screen.



5. Use the up and down buttons on the touch screen to scroll up or down to the preset or free treatment option that you would like to use. If the arrow is outlined and not solid, it is not active.

6. Select the number of the preset treatment that you want to use by pressing the program number on the touch screen. The program parameters will be displayed in the treatment setup screen.

7. This symbol will be displayed next to the waveform to indicate the Preset or user-defined "Free" program that has been selected.

8. At this point you may adjust any of the treatment parameters or just go to the next step.

9. Adjust the intensity of the channel that you are using and start treatment by pressing the "Up" arrow on the control panel.

4-Pole Interferential preset programs

Preset programs

No.	Carrier Frequency kHz	Sweep F ~ F2 Beat, Hz	Vector Sweep	Treatment Time min
1	4	80~100	0°	15
2	4	1~10	0°	15
3	4	1~100	0°	15
4	4	30~60	0°	15
5	4	100~200	0°	15

Random programs

No.	Phase	Carrier Frequency kHz	Beat Frequency Beat, Hz	Time min	Mode	Treatment Time min
6 Random Program High	1	4	80	3	Constant	15
	2	5	50~90	3	Sweep	
	3	5	30~60	3	Sweep	
	4	5	40~100	3	Sweep	
	5	5	70	3	Constant	
7 Random Program Low	1	4	5	3	Constant	9
	2	5	2~5	3	Sweep	
	3	4	3	3	Constant	
8 Random Program High+Low	1	4	80	3	Constant	12
	2	5	1~10	3	Sweep	
	3	5	30~90	3	Sweep	
	4	5	50	3	Constant	

Note: When a random program is selected, the parameters cannot be changed and the data cannot be saved.

2-Pole Interferential (Premod) preset programs

Preset programs

No.	Carrier Frequency kHz	Sweep F ~ F2 Beat, Hz	Treatment Time min
1	4	80~100	15
2	4	1~10	15
3	4	1~100	15
4	4	30~60	15
5	4	100~200	15

Random programs

No.	Phase	Carrier Frequency kHz	Beat Frequency Beat, Hz	Time min	Mode	Treatment Time min
6 Random Program High	1	4	80	3	Constant	15
	2	5	50~90	3	Sweep	
	3	5	30~60	3	Sweep	
	4	5	40~100	3	Sweep	
	5	5	70	3	Constant	
7 Random Program Low	1	4	5	3	Constant	9
	2	5	2~5	3	Sweep	
	3	4	3	3	Constant	
8 Random Program High+Low	1	4	80	3	Constant	12
	2	5	1~10	3	Sweep	
	3	5	30~90	3	Sweep	
	4	5	50	3	Constant	

Note: When a random program is selected, the parameters cannot be changed and the data cannot be saved.

EMS preset programs

No.	Carrier Frequency kHz	Ramp-up sec	Hold Time sec	Ramp-down sec	Off Time sec	Beat Frequency Beat, Hz	Treatment Time min
1	2	1.0	3.5	0.5	15	80	15
2	4	1.0	3.5	0.5	15	80	15
3	5	1.0	3.5	0.5	15	80	15
4	2	1.5	8.0	0.5	10	20	15
5	4	1.5	8.0	0.5	10	20	15
6	5	1.5	8.0	0.5	10	20	15
7	2	1.5	8.0	0.5	20	50	15
8	4	1.5	8.0	0.5	20	50	15
9	5	1.5	8.0	0.5	20	50	15

Russian preset programs

No.	Carrier Frequency kHz	Duty Cycle %	Ramp up sec	Hold Time sec	Ramp down sec	Off Time sec	Treatment Time min	Number of Contractions
1	2.5	50	1.5	8.0	0.5	50	10	10
2	2.5	60	1.5	8.0	0.5	60	8	12
3	2.5	30	1.0	4.5	0.5	30	7:12	12
4	2.5	40	1.0	3.5	0.5	40	2:40	8

High Voltage preset programs

Preset Programs

No.	Name	Frequency Hz	Pulse Duration µsec	Polarity	Treatment Time min
1	Surge-20	20	50	Positive	15
2	Surge-50	50	50	Positive	15
3	Surge-80	80	50	Positive	15
4	Sweep-1	2~5	50	Positive	15
5	Sweep-2	30~60	50	Positive	15
6	Sweep-3	40~100	50	Positive	15
7	Sweep-4	80~130	50	Positive	15

Random Programs

No.	Phase	Frequency Hz	Time min	Mode	Pulse Duration µsec	Polarity	Treatment Time min
8 High Frequency	1	80	3	Constant	50	Alternate	15
	2	50~90	3	Sweep			
	3	30~60	3	Sweep			
	4	40~100	3	Sweep			
	5	70	3	Constant			
9 Low Frequency	1	5	3	Constant	50	Alternate	15
	2	2	3	Constant			
	3	2~5	3	Sweep			
	4	1	3	Constant			
	5	3	3	Constant			
10 Low + High Frequency	1	80	3	Constant	50	Alternate	15
	2	2	3	Constant			
	3	1~10	3	Sweep			
	4	30~90	3	Sweep			
	5	50	3	Constant			

Note: When a random program is selected, the parameters cannot be changed and the data cannot be saved.

TENS preset programs

Preset Programs

No.	Name	Frequency Hz	Pulse Duration µsec	Treatment Time min
1	Surge- 5 Hz	5	200	15
2	Surge – 50 Hz	50	150	15
3	Surge – 100 Hz	100	100	15

Random Programs

No.	Phase	Frequency Hz	Time min	Mode	Pulse Duration µsec	Treatment Time min
4 High Frequency	1	80	2	Constant	100	15
	2	120	3	Surge-120	80	
	3	30/80	4	Dual-Freq	200/100	
	4	150	3	Surge-150	60	
	5	100	3	Constant	60	
5 Low Frequency	1	2	2	Burst	150	15
	2	3/7	4	Dual-Freq	200/150	
	3	1	3	Constant	250	
	4	10	3	Surge-10	100	
	5	5	3	Constant	170	
6 Low + High Frequency	1	3	3	Burst	120	15
	2	50	2	Surge-50	160	
	3	5/10	4	Dual-Freq	200/100	
	4	80	3	Surge-80	70	
	5	120	3	Constant	50	

Note: When a random program is selected, the parameters cannot be changed and the data cannot be saved.
Surge program: Ramp up: 2 sec, Hold: 4 sec, Ramp down: 1 sec, Off: 6 sec

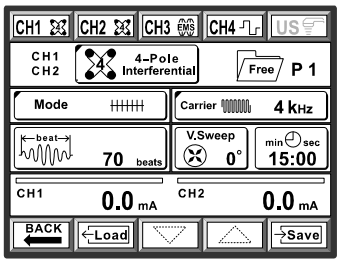
Microcurrent preset programs

No.	Phase	Frequency Hz	Polarity	Time min	Treatment time min
1	1	1	Alternate	5	15
	2	0.3	Alternate	10	
2	1	10	Alternate	5	15
	2	0.3	Alternate	10	
3	1	80	Alternate	5	15
	2	0.3	Alternate	10	
4	1	200	Alternate	5	15
	2	0.5	Alternate	10	
5	1	300	Alternate	5	15
	2	0.5	Alternate	10	

Ultrasound preset programs

One MHz				
No.	Output mode %	Output W/cm²	Combination	Treatment Time min
1	100	2.0	N/A	5
2	100	1.3	N/A	5
3	100	1.0	N/A	5
4	100	0.5	N/A	5
5	50	1.5	N/A	5
6	50	0.8	N/A	5
7	20	1.0	N/A	5
8	20	0.5	N/A	5
9	10	2.0	N/A	5
10	10	1.5	N/A	5
Three MHz				
No.	Output mode %	Output W/cm²	Combination	Treatment Time min
11	100	1.0	N/A	5
12	100	0.7	N/A	5
13	100	0.4	N/A	5
14	50	1.0	N/A	5
15	50	0.7	N/A	5
16	20	1.0	N/A	5
17	20	0.7	N/A	5

4.6 Saving a Treatment Protocol



1. Choose the channel you want to use. Then, set the treatment parameters that you would like to retain in memory in the treatment setup mode.

2. To the right of the waveform this icon is displayed to indicate that you can save to User defined program slot.

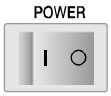
3. Press the "Save" button to store your program into memory.

4. Press "1" on the touch screen to store the program into the "#1 Free Program" slot. There are ten slots for programs to be saved for each waveform, ultrasound and combination therapy.

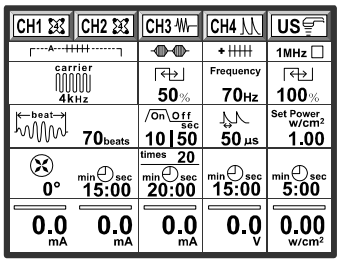
5. You can immediately use your program by pressing the "Back" button on the touch screen.

6. Adjust the intensity and start treatment for the channel that you are using by pressing the "Up" arrow on the control panel.

4.7 4-Pole Interferential Stimulation Set-up Procedure

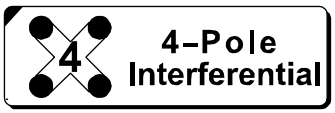


1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.

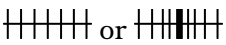


2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

3. On the touch screen, press the channel key of the channel you would like to run interferential therapy. For this mode you will need 2 channels, either channels 1 & 2 together or 3 & 4 together. Regardless of which channel you select, the Sonicator Plus 940 will automatically pick the other channel of the channel pair.

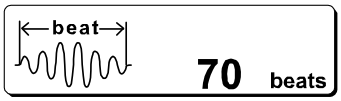


4. Press the waveform button on the touch screen display until "4-Pole Interferential" is displayed.

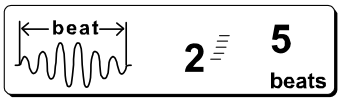


5. Select the Mode, either continuous or frequency modulation by pressing the mode button until the correct one is displayed.

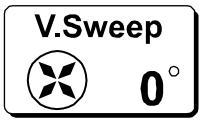
6. Select the carrier frequency by pressing the symbol on the left then pressing the up and down arrows on the touch screen display. You can choose from 2, 4 or 5 kHz.



or

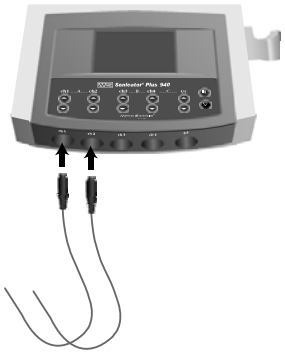


7. Select the beat frequency by pressing the symbol on the left then pressing the up and down arrows on the touch screen display. You can choose from 1-250 beats. For the beat frequency sweep, press first the lower number and adjust it and then press the upper number and adjust it by pressing the up and down arrows on the touch screen display.

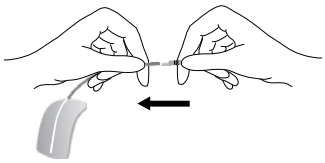


8. Select the Vector Sweep angle by pressing the "V. Sweep" button and then the up and down arrows on the touch screen display. You can choose from 0°, 15°, 30° or 45°.

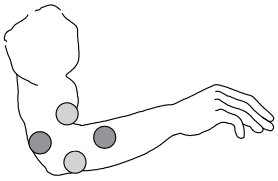
9. Select the treatment time by pressing the "min sec" button and then the up and down arrows on the touch screen display. You can choose from 1-60 minutes.



10. Plug two electrode cables into either channels 1 & 2 or 3 & 4 corresponding to the channels that you have programmed.



11. Plug the cables into four electrodes.



12. Stick the electrodes on the patient. You will need two electrodes for each channel, four in total.

13. Adjust the intensity and start treatment for either channel 1 or 3 depending on which channel pair you are using by pressing the "Up" arrow on the control panel. The other channel in the channel pair will go up simultaneously. If you then want to fine tune the intensity in the other channel (2 or 4) you can adjust it independently. The maximum intensity is 100 mA peak.

14. The channel buttons of the two channels that have active stimulation treatments will blink to let you know that they are active. Channel buttons that are not blinking are not active and can be used for additional setups.

15. If you attempt to adjust the intensity of a channel with no electrodes stuck on the patient you will get an "Open Error". You will also get this message if the electrode cable is broken or the electrode is not making good contact with the patient.

16. To clear an error press the red "Stop" key and the channels will reset. You can then correct the error and restart the treatment. Pressing this button will also reset all treatment parameters to their default values, so you will need to reprogram any programs that are different from the default settings.

17. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

4-Pole Interferential preset programs

Preset programs

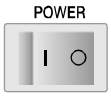
No.	Carrier Frequency kHz	Sweep F ~ F2 Beat, Hz	Vector Sweep	Treatment Time min
1	4	80~100	0°	15
2	4	1~10	0°	15
3	4	1~100	0°	15
4	4	30~60	0°	15
5	4	100~200	0°	15

Random programs

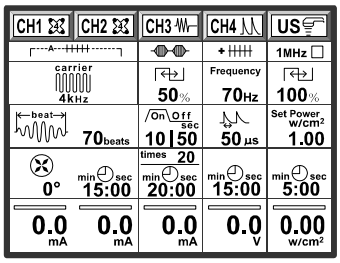
No.	Phase	Carrier Frequency kHz	Beat Frequency Beat, Hz	Time min	Mode	Treatment Time min
6 Random Program High	1	4	80	3	Constant	15
	2	5	50~90	3	Sweep	
	3	5	30~60	3	Sweep	
	4	5	40~100	3	Sweep	
	5	5	70	3	Constant	
7 Random Program Low	1	4	5	3	Constant	9
	2	5	2~5	3	Sweep	
	3	4	3	3	Constant	
8 Random Program High+Low	1	4	80	3	Constant	12
	2	5	1~10	3	Sweep	
	3	5	30~90	3	Sweep	
	4	5	50	3	Constant	

Note: When a random program is selected, the parameters cannot be changed and the data cannot be saved.

4.8 2-Pole Interferential Stimulation Set-up Procedure



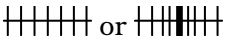
1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.



2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

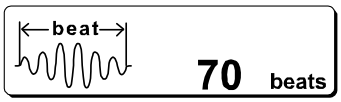
3. On the touch screen, press the channel key of the channel where you would like to run 2- Pole interferential (Premodulated) therapy. For this mode you will need one channel.

4. Press the waveform button on the touch screen display until "2-Pole Interferential" is displayed.

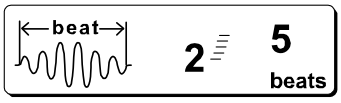


5. Select the Mode, either continuous or frequency modulation, by pressing the mode button until the correct one is displayed.

6. Select the carrier frequency by pressing the symbol on the left then pressing the up and down arrows on the touch screen display. You can choose from 2, 4 or 5 kHz.

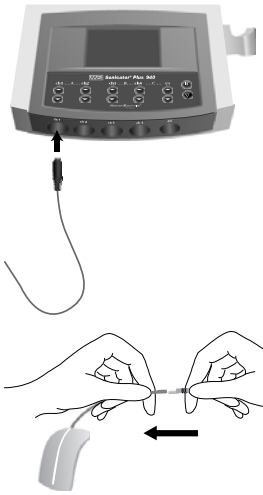


or



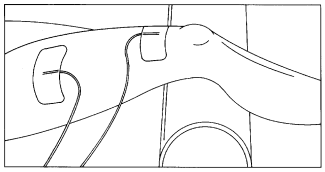
7. Select the beat frequency by pressing the symbol on the left then pressing the up and down arrows on the touch screen display. You can choose from 1-250 beats. For the beat frequency sweep, press first the lower number and adjust it and then the upper number by pressing the up and down arrows on the touch screen display.

8. Select the treatment time by pressing the "min sec" button and then the up and down arrows on the touch screen display. You can choose from 1-60 minutes.



9. Plug one electrode cable into the channel corresponding to the channel that you have programmed.

10. Plug the cable into two electrodes.



11. Stick the electrodes on the patient. You will need two electrodes for each channel.

12. Adjust the intensity and start treatment for the channel that you are using. The maximum intensity is 100 mA peak.

13. The channel button of the channel that has an active stimulation treatment will blink to let you know that it is active. Channel buttons that are not blinking are not active and can be used for additional setups.

14. If you attempt to adjust the intensity of a channel with no electrodes stuck on the patient you will get an "Open Error". You will also get this message if the electrode cable is broken or the electrode is not making good contact with the patient.

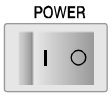
15. To clear an error press the red "Stop" key and the channels will reset. You can then correct the error and restart the treatment. Pressing this button will also reset <u>all</u> treatment parameters to their default values, so you will need to reprogram any programs that are different from the default settings.

16. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

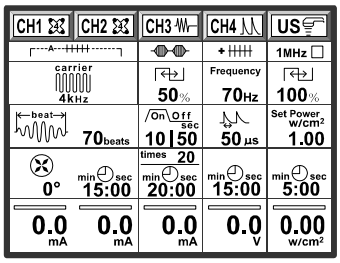
2-Pole Interferential (Premod) preset programs

Preset programs						
No.	Carrier Frequency kHz		Sweep F ~ F2 Beat, Hz			Treatment Time min
1	4		80~100			15
2	4		1~10			15
3	4		1~100			15
4	4		30~60			15
5	4		100~200			15
Random programs						
No.	Phase	Carrier Frequency kHz	Beat Frequency Beat, Hz	Time min	Mode	Treatment Time min
6 Random Program High	1	4	80	3	Constant	15
	2	5	50~90	3	Sweep	
	3	5	30~60	3	Sweep	
	4	5	40~100	3	Sweep	
	5	5	70	3	Constant	
7 Random Program Low	1	4	5	3	Constant	9
	2	5	2~5	3	Sweep	
	3	4	3	3	Constant	
8 Random Program High+Low	1	4	80	3	Constant	12
	2	5	1~10	3	Sweep	
	3	5	30~90	3	Sweep	
	4	5	50	3	Constant	
Note: When a random program is selected, the parameters cannot be changed and the data cannot be saved.						

4.9 EMS Stimulation Set-up Procedure



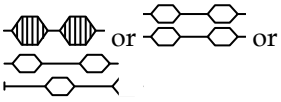
1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.



2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

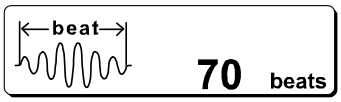
3. On the touch screen, press the channel key of the channel where you would like to run EMS (electrical muscle stimulation). For this mode you will need one or two channels.

4. Press the waveform button on the touch screen display until "EMS" is displayed.



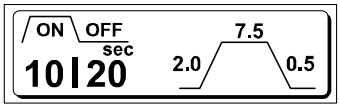
5. Select the Mode, either surge, surge in 2 channels or reciprocation by pressing the mode button until the correct one is displayed.

6. Select the carrier frequency by pressing the symbol on the left then pressing the up and down arrows on the touch screen display. You can choose from 2, 4 or 5 kHz.



7. Select the beat frequency by pressing the symbol on the left then pressing the up and down arrows on the touch screen display. You can choose from 20-250 beats.

8. Set the On / Off time by pressing the large numbers under "On" and "Off" and then pressing the up and down arrows on the touch screen display. The maximum On time is 30 seconds. The maximum "Off" time is 99 seconds. Usually the Off time is twice the On time.

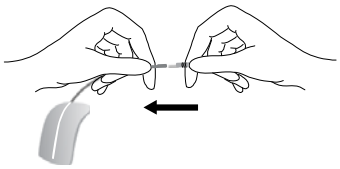


You can also set the up and down ramp times by pressing the numbers in the illustration to the right of the large numbers and then pressing the up and down arrows on the touch screen display. Ramp times are included in the On time. Maximum ramp time for both the up and down ramps is 3 seconds.

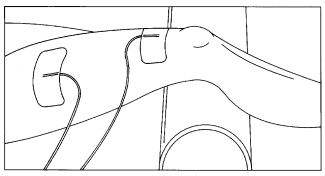
9. Select the number of contractions using this selector and then pressing the up and down arrows on the touch screen display. The time will go up or down based on the number of contractions requested.

10. You can also set the treatment time by pressing the "min sec" button and then the up and down arrows on the touch screen display. You can choose from 1-60 minutes. The number of contractions will change up or down with the treatment time.

11. Plug the electrode cable(s) into the channel(s) corresponding to the channel(s) that you have programmed.



12. Plug each cable into two electrodes.



13. Stick the electrodes on the patient. You will need two electrodes for each channel.

14. Adjust the intensity and start treatment for the channel that you are using. If you are using Surge in two channels they will go up together. To fine-tune the second channel press the up arrow on that channel. In the reciprocation mode, you will adjust each channel separately. The second channel will be off during the first channel's adjustment and vice versa. You can adjust intensity up or down at any time. The timer will stop during the adjustment and resume the On and Off time cycle after a few seconds. The maximum intensity is 100 mA peak.

Please note: In the surge mode the Sonicator Plus 940 enters adjustment mode when the clinician presses the intensity control button. It remains in adjustment mode for 10 seconds after the button is released. Check the subjective intensity experienced by the patient during this time and adjust output intensity accordingly. The timer will be active during this time.

15. The channel button of the channel that has an active stimulation treatment will blink to let you know that it is active. Channel buttons that are not blinking are not active and can be used for additional setups.

16. If you attempt to adjust the intensity of a channel with no electrodes stuck on the patient you will get an "Open Error". You will also get this message if the electrode cable is broken or the electrode is not making good contact with the patient.

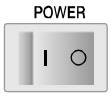
17. To clear an error press the red "Stop" key and the channels will reset. You can then correct the error and restart the treatment. Pressing this button will also reset <u>all</u> treatment parameters to their default values, so you will need to reprogram any programs that are different from the default settings.

18. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

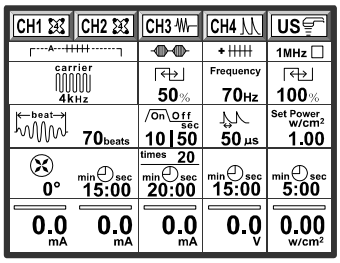
EMS preset programs

No.	Carrier Frequency kHz	Ramp-up sec	Hold Time sec	Ramp-down sec	Off Time sec	Beat Frequency Beat, Hz	Treatment Time min
1	2	1.0	3.5	0.5	15	80	15
2	4	1.0	3.5	0.5	15	80	15
3	5	1.0	3.5	0.5	15	80	15
4	2	1.5	8.0	0.5	10	20	15
5	4	1.5	8.0	0.5	10	20	15
6	5	1.5	8.0	0.5	10	20	15
7	2	1.5	8.0	0.5	20	50	15
8	4	1.5	8.0	0.5	20	50	15
9	5	1.5	8.0	0.5	20	50	15

4.10 Russian Stimulation Set-up Procedure



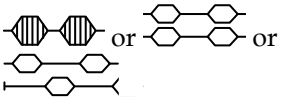
1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.



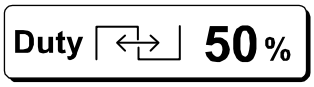
2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

3. On the touch screen, press the channel key of the channel where you would like to run Russian Stimulation. For this mode you will need one or two channels.

4. Press the waveform button on the touch screen display until "Russian" is displayed. The carrier frequency is automatically set to 2.5 kHz.

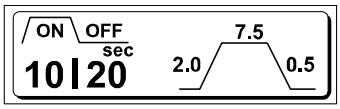


5. Select the Mode, either surge, surge in 2 channels or reciprocation by pressing the mode button until the correct one is displayed.



6. Select the burst "Duty Cycle" control and then adjust it in 10% increments using the up and down arrows on the touch screen display. The range is 10 to 100%. This sets percentage of on time within a period of 20 ms. For example: a duty cycle of 50% produces a burst of 10 ms on and 10 ms off.

7. Set the On / Off time by pressing the large numbers under "On" and "Off" and then pressing the up and down arrows on the touch screen display. The maximum On time is 30 seconds. The maximum "Off" time is 99 seconds. Usually the Off time is twice the On time.

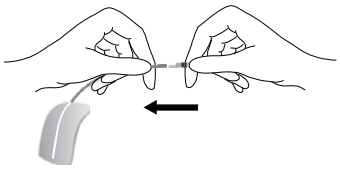


You can also set the up and down ramp times by pressing the numbers in the illustration to the right of the large numbers and then pressing the up and down arrows on the touch screen display. Ramp times are included in the On time. Maximum ramp time for both the up and down ramps is 3 seconds.

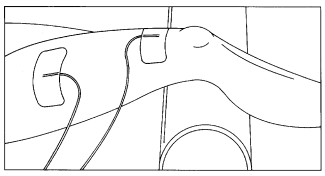
8. Select the number of contractions using this selector and then pressing the up and down arrows on the touch screen display. The time will go up or down based on the number of contractions requested.

9. You can also set the treatment time by pressing the "min sec" button and then the up and down arrows on the touch screen display. You can choose from 1-60 minutes. The number of contractions will change up or down with the treatment time.

10. Plug the electrode cable(s) into the channel(s) corresponding to the channel(s) that you have programmed.



11. Plug each cable into two electrodes.



12. Stick the electrodes on the patient. You will need two electrodes for each channel.

13. Adjust the intensity and start treatment for the channel that you are using. If you are using Surge in two channels they will go up together. To fine-tune the second channel press the up arrow on that channel. In the reciprocation mode, you will adjust each channel separately. The second channel will be off during the first channel's adjustment and vice versa. You can adjust intensity up or down at any time. The timer will stop during the adjustment and resume the On and Off time cycle after a few seconds. The maximum intensity is 100 mA peak.

Please note: In the surge mode the Sonicator Plus 940 enters adjustment mode when the clinician presses the intensity control button. It remains in adjustment mode for 10 seconds after the button is released. Check the subjective intensity experienced by the patient during this time and adjust output intensity accordingly. The timer will be active during this time.

14. The channel button of the channel that has an active stimulation treatment will blink to let you know that it is active. Channel buttons that are not blinking are not active and can be used for additional setups.

15. If you attempt to adjust the intensity of a channel with no electrodes stuck on the patient you will get an "Open Error". You will also get this message if the electrode cable is broken or the electrode is not making good contact with the patient.

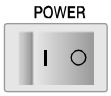
16. To clear an error press the red "Stop" key and the channels will reset. You can then correct the error and restart the treatment. Pressing this button will also reset <u>all</u> treatment parameters to their default values, so you will need to reprogram any programs that are different from the default settings.

17. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

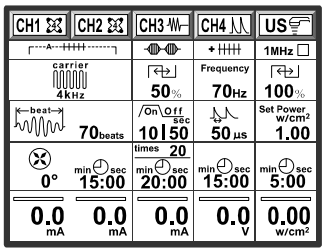
Russian preset programs

No.	Carrier Frequency kHz	Duty Cycle %	Ramp up sec	Hold Time sec	Ramp down sec	Off Time sec	Treatment Time min	Number of Contractions
1	2.5	50	1.5	8.0	0.5	50	10	10
2	2.5	60	1.5	8.0	0.5	60	8	12
3	2.5	30	1.0	4.5	0.5	30	7:12	12
4	2.5	40	1.0	3.5	0.5	40	2:40	8

4.11 High Voltage Stimulation Set-up Procedure

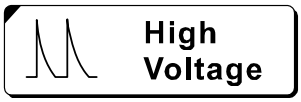


4. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.

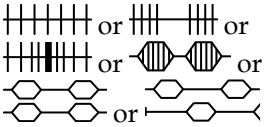


5. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

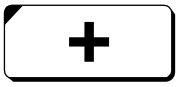
6. On the touch screen, press the channel key of the channel where you would like to run High Voltage Stimulation. For this mode you will need one or two channels.



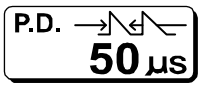
7. Press the waveform button on the touch screen display until "High Voltage" is displayed.



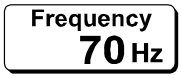
8. Select the Mode, either continuous, burst, frequency modulation, surge, surge in 2 channels or reciprocation by pressing the mode button until the correct one is displayed.



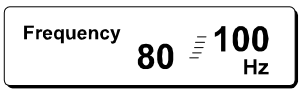
9. Select the Polarity control and then adjust it to "+", "-" or "±" using the up and down arrows on the touch screen display. "+" is equal to positive polarity, "-" is equal to negative polarity and "±" is equal to bipolar.



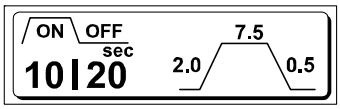
10. Select the "P.D." control to set the pulse duration using the up and down arrows on the touch screen display. These can be set from 10-70 µs in 10 µs increments.



or



11. Select the "frequency" control to set the frequency using the up and down arrows on the touch screen display. This can be set from 0.5-200 Hz for the continuous mode, 0.5-7 Hz in the burst mode, 20-200 Hz in the surge and reciprocation modes. In the frequency modulation mode the low and high frequencies can be set from 1-200 Hz.



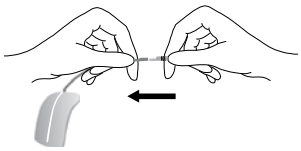
12. Set the On / Off time for the surge and reciprocation modes by pressing the large numbers under "On" and "Off" and then pressing the up and down arrows on the touch screen display. The maximum On time is 30 seconds. The maximum "Off" time is 99 seconds. Usually the Off time is twice the On time.

    You can also set the up and down ramp times by pressing the numbers in the illustration to the right of the large numbers and then pressing the up and down arrows on the touch screen display. Ramp times are included in the On time. Maximum ramp time for both the up and down ramps is 3 seconds.

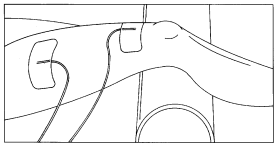
13. Select the number of contractions for the surge and reciprocation modes using this selector and then pressing the up and down arrows on the touch screen display. The time will go up or down based on the number of contractions requested.

14. You can also set the treatment time by pressing the "min sec" button and then the up and down arrows on the touch screen display. You can choose from 1-60 minutes. The number of contractions will change up or down with the treatment time.

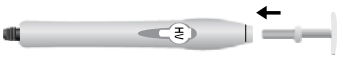
15. Plug the electrode cable(s) into the channel(s) corresponding to the channel(s) that you have programmed.



16. Plug each cable into two electrodes.

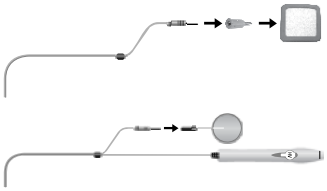


17. Stick the electrodes on the patient. You will need two electrodes for each channel.



15. You may also use the High Voltage Probe. First snap in the electrode size that you want to use for your application.

16. Place the sponge over the disc and then cover with the fabric cover to hold the sponge in place. Moisten with tap water. Press the button on the high voltage probe when you want to deliver stimulation.



17. Use either a self-adhesive electrode or the sponge electrode supplied with the high voltage probe as a dispersive electrode. Secure a sponge electrode to the patient with a Velcro strap.

18. Adjust the intensity and start treatment for the channel that you are using. If you are using Surge in two channels they will go up together. To fine-tune the second channel press the up arrow on that channel. In the reciprocation mode, you will adjust each channel separately. The second channel will be off during the first channel's adjustment and vice versa. You can adjust intensity up or down at any time. The timer will stop during the adjustment and resume the On and Off time cycle after a few seconds.

Please note: In the surge mode the Sonicator Plus 940 enters adjustment mode when the clinician presses the intensity control button. It remains in adjustment mode for 10 seconds after the button is released. Check the subjective intensity experienced by the patient during this time and adjust output intensity accordingly. The timer will be active during this time.

19. The channel button of the channel that has an active stimulation treatment will blink to let you know that it is active. Channel buttons that are not blinking are not active and can be used for additional setups.

! OPEN ERROR

20. If you attempt to adjust the intensity of a channel with no electrodes stuck on the patient you will get an "Open Error". You will also get this message if the electrode cable is broken or the electrode is not making good contact with the patient.

21. To clear an error press the red "Stop" key and the channels will reset. You can then correct the error and restart the treatment. Pressing this button will also reset all treatment parameters to their default values, so you will need to reprogram any programs that are different from the default settings. The maximum intensity is 150 mA peak.

22. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

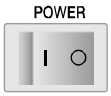
High Voltage preset programs

Preset Programs					
No.	Name	Frequency Hz	Pulse Duration µsec	Polarity	Treatment Time min
1	Surge-20	20	50	Positive	15
2	Surge-50	50	50	Positive	15
3	Surge-80	80	50	Positive	15
4	Sweep-1	2~5	50	Positive	15
5	Sweep-2	30~60	50	Positive	15
6	Sweep-3	40~100	50	Positive	15
7	Sweep-4	80~130	50	Positive	15

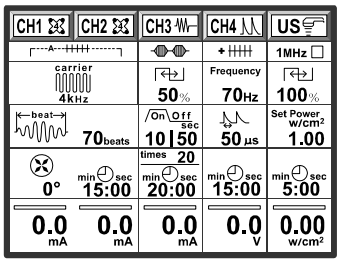
Random Programs							
No.	Phase	Frequency Hz	Time min	Mode	Pulse Duration µsec	Polarity	Treatment Time min
8 High Frequency	1	80	3	Constant	50	Alternate	15
	2	50~90	3	Sweep			
	3	30~60	3	Sweep			
	4	40~100	3	Sweep			
	5	70	3	Constant			
9 Low Frequency	1	5	3	Constant	50	Alternate	15
	2	2	3	Constant			
	3	2~5	3	Sweep			
	4	1	3	Constant			
	5	3	3	Constant			
10 Low + High Frequency	1	80	3	Constant	50	Alternate	15
	2	2	3	Constant			
	3	1~10	3	Sweep			
	4	30~90	3	Sweep			
	5	50	3	Constant			

Note: When a random program is selected, the parameters cannot be changed and the data cannot be saved.

4.12 TENS Stimulation Set-up Procedure



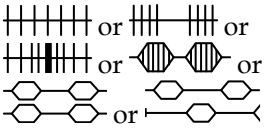
1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.



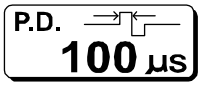
2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

3. On the touch screen, press the channel key of the channel where you would like to run TENS. For this mode you will need one or two channels.

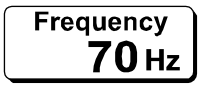
4. Press the waveform button on the touch screen display until "TENS" is displayed.



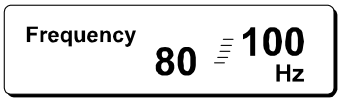
5. Select the Mode, either continuous, burst, frequency modulation, surge, surge in 2 channels or reciprocation by pressing the mode button until the correct one is displayed.



6. Select the "P.D." control to set the pulse duration using the up and down arrows on the touch screen display. These can be set from 50-300 µs in 10 µs increments.

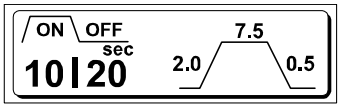


or



7. Select the "frequency" control to set the frequency using the up and down arrows on the touch screen display. This can be set from 0.5-250 Hz for the continuous mode, 0.5-7 Hz in the burst mode, 20-250 Hz in the surge and reciprocation modes. In the frequency modulation mode the low and high frequencies can be set from 1-250 Hz.

8. Set the On / Off time for the surge and reciprocation modes by pressing the large numbers under "On" and "Off" and then pressing the up and down arrows on the touch screen display. The maximum On time is 30 seconds. The maximum "Off" time is 99 seconds. Usually the Off time is twice the On time.

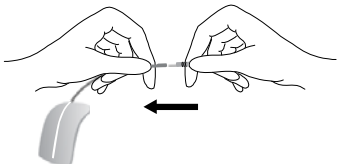


You can also set the up and down ramp times by pressing the numbers in the illustration to the right of the large numbers and then pressing the up and down arrows on the touch screen display. Ramp times are included in the On time. Maximum ramp time for both the up and down ramps is 3 seconds.

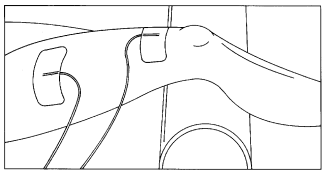
9. Select the number of contractions for the surge and reciprocation modes using this selector and then pressing the up and down arrows on the touch screen display. The time will go up or down based on the number of contractions requested.

10. You can also set the treatment time by pressing the "min sec" button and then the up and down arrows on the touch screen display. You can choose from 1-60 minutes. The number of contractions will change up or down with the treatment time.

11. Plug the electrode cable(s) into the channel(s) corresponding to the channel(s) that you have programmed.



12. Plug each cable into two electrodes.



13. Stick the electrodes on the patient. You will need two electrodes for each channel.

14. Adjust the intensity and start treatment for the channel that you are using. If you are using Surge in two channels they will go up together. To fine-tune the second channel press the up arrow on that channel. In the reciprocation mode, you will adjust each channel separately. The second channel will be off during the first channel's adjustment and vice versa. You can adjust intensity up or down at any time. The timer will stop during the adjustment and resume the On and Off time cycle after a few seconds. The maximum intensity is 100 mA peak.

    Please note: In the surge mode the Sonicator Plus 940 enters adjustment mode when the clinician presses the intensity control button. It remains in adjustment mode for 10 seconds after the button is released. Check the subjective intensity experienced by the patient during this time and adjust output intensity accordingly. The timer will be active during this time.

15. The channel button of the channel that has an active stimulation treatment will blink to let you know that it is active. Channel buttons that are not blinking are not active and can be used for additional setups.

16. If you attempt to adjust the intensity of a channel with no electrodes stuck on the patient you will get an "Open Error". You will also get this message if the electrode cable is broken or the electrode is not making good contact with the patient.

17. To clear an error press the red "Stop" key and the channels will reset. You can then correct the error and restart the treatment. Pressing this button will also reset <u>all</u> treatment parameters to their default values, so you will need to reprogram any programs that are different from the default settings.

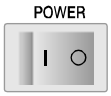
18. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

TENS preset programs

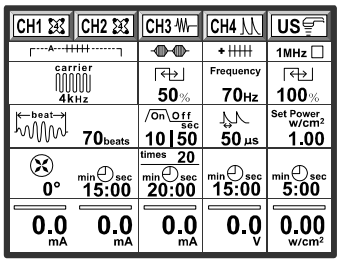
Preset Programs						
No.	Name		Frequency Hz		Pulse Duration µsec	Treatment Time min
1	Surge- 5 Hz		5		200	15
2	Surge – 50 Hz		50		150	15
3	Surge – 100 Hz		100		100	15
Random Programs						
No.	Phase	Frequency Hz	Time min	Mode	Pulse Duration µsec	Treatment Time min
4 High Frequency	1	80	2	Constant	100	15
	2	120	3	Surge-120	80	
	3	30/80	4	Dual-Freq	200/100	
	4	150	3	Surge-150	60	
	5	100	3	Constant	60	
5 Low Frequency	1	2	2	Burst	150	15
	2	3/7	4	Dual-Freq	200/150	
	3	1	3	Constant	250	
	4	10	3	Surge-10	100	
	5	5	3	Constant	170	
6 Low + High Frequency	1	3	3	Burst	120	15
	2	50	2	Surge-50	160	
	3	5/10	4	Dual-Freq	200/100	
	4	80	3	Surge-80	70	
	5	120	3	Constant	50	

Note: When a random program is selected, the parameters cannot be changed and the data cannot be saved.
Surge program: Ramp up: 2 sec, Hold: 4 sec, Ramp down: 1 sec, Off: 6 sec

4.13 Microcurrent Stimulation Set-up Procedure

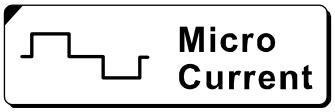


1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.

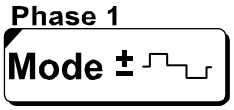


2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

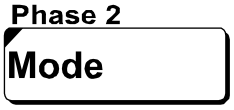
3. On the touch screen, press the channel key of the channel where you would like to run Microcurrent stimulation. For this mode you will need one channel.



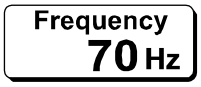
4. Press the waveform button on the touch screen display until "Micro Current" is displayed.



5. Select the Mode for Phase 1, either positive, negative or bipolar by using the up and down arrows on the touch screen display.



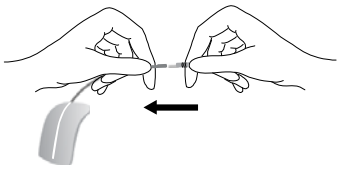
6. Select the Mode for Phase 2, either none, positive, negative or bipolar by using the up and down arrows on the touch screen display. Setting Phase 2 to something other than "none" allows you to set up a second round of Micro Current stimulation with different parameters that will immediately follow Phase 1.



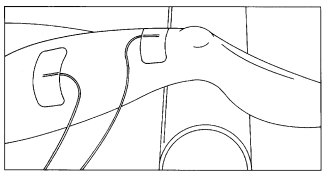
7. Select the "frequency" control to set the frequency using the up and down arrows on the touch screen display. The frequency range is from 0.3 to 400 Hz.

8. You can set the treatment time for both phases by pressing the "min sec" button and then the up and down arrows on the touch screen display. You can choose from 1-60 minutes for either as long as the total between phases does not exceed 60 minutes.

9. Plug one electrode cable into the channel corresponding to the channel that you have programmed.



10. Plug the cable into two electrodes.



11. Stick the electrodes on the patient. You will need two electrodes for each channel.

12. Adjust the intensity and start treatment for the channel that you are using. If no electrodes are plugged in the output will not increase but there will be no "Open Error' as seen with other stimulation waveforms. The maximum intensity is 750 µA.

13. The channel button of the channel that has an active stimulation treatment will blink to let you know that it is active. Channel buttons that are not blinking are not active and can be used for additional setups.

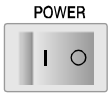
14. To clear an error press the red "Stop" key and the channels will reset. You can then correct the error and restart the treatment. Pressing this button will also reset <u>all</u> treatment parameters to their default values, so you will need to reprogram any programs that are different from the default settings.

15. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

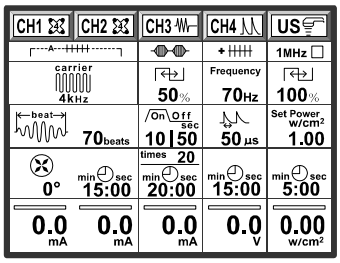
Microcurrent preset programs

No.	Phase	Frequency Hz	Polarity	Time min	Treatment time min
1	1	1	Alternate	5	15
	2	0.3	Alternate	10	
2	1	10	Alternate	5	15
	2	0.3	Alternate	10	
3	1	80	Alternate	5	15
	2	0.3	Alternate	10	
4	1	200	Alternate	5	15
	2	0.5	Alternate	10	
5	1	300	Alternate	5	15
	2	0.5	Alternate	10	

4.14 DC Stimulation Set-up Procedure



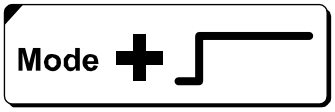
1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.



2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

3. On the touch screen, press the channel key of the channel where you would like to run Direct Current. For this mode you will need one channel.

4. Press the waveform button on the touch screen display until "DC" is displayed.



5. Select the Mode for either positive or negative by using the up and down arrows on the touch screen display.

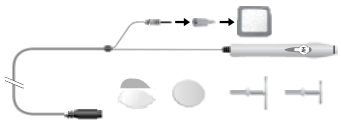
6. You can set the treatment time by pressing the "min sec" button and then the up and down arrows on the touch screen display. You can choose from 1-60 minutes.

7. Plug one electrode cable into the channel corresponding to the channel that you have programmed.

8. Plug the cable into two electrodes. For DC you cannot use self-adhesive electrodes unless they are marked for use with DC current. You must use sponge electrodes moistened with tap water. To adapt to the pin connectors use pin to banana adapters.

9. You may also use the High Voltage Probe. First snap in the electrode size that you want to use for your application.

10. Place the sponge over the disc and then cover with the fabric cover to hold the sponge in place. Moisten with tap water.



11. On the free pin connector place a pin-to-banana adapter and then a sponge electrode. Press the button on the high voltage probe when you want to deliver stimulation to the patient.

12. Secure the sponge electrodes to the patient with Velcro straps.

13. Adjust the intensity of the channel that you are using. Use caution when applying direct current since it can be extremely irritating and can even cause burns if not applied properly. The maximum intensity with this waveform is 20 mA.

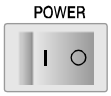
14. If you attempt to adjust the intensity of a channel with no electrodes stuck on the patient you will get an “Open Error”. You will also get this message if the electrode cable is broken or the electrode is not making good contact with the patient. This function is disabled when using the High Voltage Probe.

15. The channel button of the channel that has an active stimulation treatment will blink to let you know that it is active. Channel buttons that are not blinking are not active and can be used for additional setups.

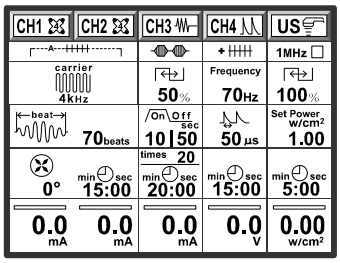
16. To clear an error press the red “Stop” key and the channels will reset. You can then correct the error and restart the treatment. Pressing this button will also reset all treatment parameters to their default values, so you will need to reprogram any programs that are different from the default settings.

17. Pressing “Hold” on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

4.15 Therapeutic Ultrasound Setup Procedure

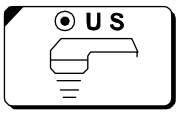


1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.



2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

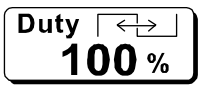
3. On the touch screen, press the ultrasound channel to select the ultrasound set-up screen.



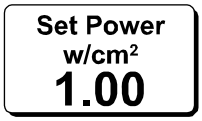
4. Press the ultrasound only button for an ultrasound treatment.

5. Press this button twice to select "OTM" if you are going to use a cream or ointment for your treatment. Use "GEL" if you are using an ultrasound gel as a couplant for your treatment.

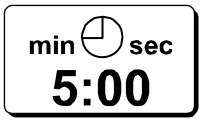
6. Press the ultrasound frequency button to select 1 or 3 MHz.



7. Press the "Duty" button to set the duty cycle by using the up and down arrows on the touch screen display. Continuous ultrasound is 100%. The other choices are 5, 10, 20, 30, 40 or 50%. The pulse rate is always 100 Hz.



8. Press the "Set Power" button to preset the ultrasound intensity by using the up and down arrows on the touch screen display. In the continuous mode the maximum power is 2.00 w/cm². In the pulsed mode the maximum power is 3.00 w/cm².

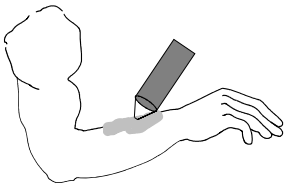


9. You can set the treatment time by pressing the "min sec" button and then the up and down arrows on the touch screen display. You can choose from 1-30 minutes.

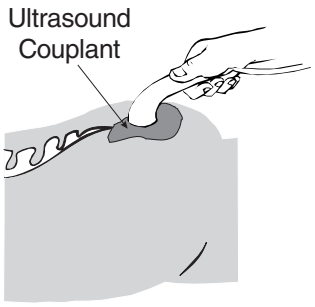
10. You can set the units for the display by pressing the w/cm² symbol next to the "0.00". Once selected pressing it additional times toggles between "w" and "w/cm²".

11. For ultrasound, plug the ultrasound applicator into the receptacle labeled "US".

12. Wait for the "L" or "S" indicator to illuminate on the screen showing which applicator is in use.



13. Apply a layer of ultrasound couplant gel to the treatment area.



14. Couple the applicator to the treatment area by keeping the entire surface of the applicator in contact with the gel that has been applied to the patient. This will ensure an efficient delivery of therapeutic ultrasound to the patient. Green LEDs on either side of the applicator will light when coupling is achieved after treatment is initiated.

15. Adjust the intensity level for the ultrasound. It will immediately go up to the level that was preset before treatment began.

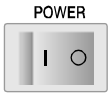
16. If you hear an intermittent beeping sound or the green light on the applicator does not illuminate, there is inadequate coupling to the patient. Reapply gel and start again. If the display never leaves zero and the bar doesn't darken, the couplant is not appropriate for ultrasound. In addition, the timer does not run if there is inadequate coupling, so if you are using a marginal couplant, treatments may take longer than expected.

17. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

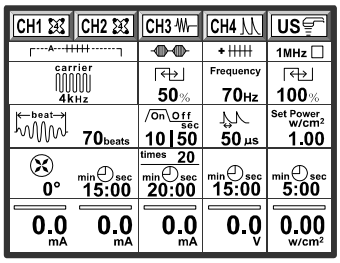
Ultrasound preset programs

One MHz				
No.	Output mode %	Output W/cm²	Combination	Treatment Time min
1	100	2.0	N/A	5
2	100	1.3	N/A	5
3	100	1.0	N/A	5
4	100	0.5	N/A	5
5	50	1.5	N/A	5
6	50	0.8	N/A	5
7	20	1.0	N/A	5
8	20	0.5	N/A	5
9	10	2.0	N/A	5
10	10	1.5	N/A	5
Three MHz				
No.	Output mode %	Output W/cm²	Combination	Treatment Time min
11	100	1.0	N/A	5
12	100	0.7	N/A	5
13	100	0.4	N/A	5
14	50	1.0	N/A	5
15	50	0.7	N/A	5
16	20	1.0	N/A	5
17	20	0.7	N/A	5

4.16 Combination Therapy Setup Procedure

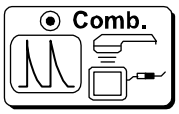


1. Turn on the mains power switch located on the back of the unit by pressing "**I**" icon on switch.



2. When you first turn the Sonicator Plus 940 on, the default parameters for each of the four stimulation channels and the ultrasound channel are displayed.

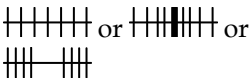
3. On the touch screen, press the ultrasound channel to select the ultrasound set-up screen.



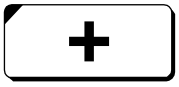
4. Press the "Comb." button for a combination therapy treatment.

5. Press the "Comb." button repeatedly to select the waveform that you would like to use. You may choose from the following stimulation waveforms: High voltage, 2-pole interferential, DC, Micro Current and TENS.

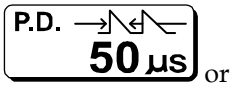
6. Press the "GEL" button twice to select "OTM" if you are going to use a cream or ointment for your treatment. Use "GEL" if you are using an ultrasound gel as a couplant for your treatment. Remember, since you are doing combination therapy the preparation that you use must conduct electricity to be effective.



7. For high voltage, TENS and 2-pole interferential waveforms select the Mode, either continuous or frequency modulation, by pressing the mode button until the correct one is displayed. For the high voltage and TENS waveforms the burst mode is also available. For microcurrent and DC, the mode that you can select is positive or negative. Microcurrent also has a bipolar mode.



8. For high voltage select positive, negative or bipolar.



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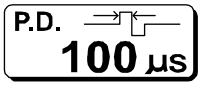
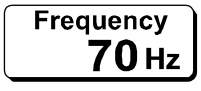
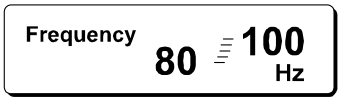


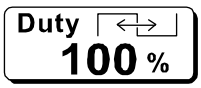
9. Set the pulse duration for high voltage or TENS



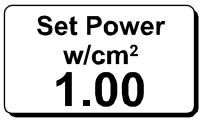
or


10. For the continuous, frequency modulated and burst modes input the treatment frequency.

11. Press the ultrasound frequency button to select 1 or 3 MHz.



12. Press the "Duty" button to set the duty cycle by using the up and down arrows on the touch screen display. Continuous ultrasound is 100%. The other choices are 5, 10, 20, 30, 40 or 50%. The pulse rate is always 100 Hz.



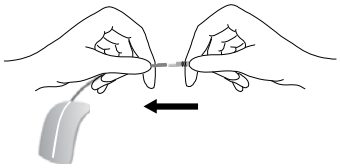
13. Press the "Set Power" button to preset the ultrasound intensity by using the up and down arrows on the touch screen display. In the continuous mode the maximum power is 2.00 w/cm². In the pulsed mode the maximum power is 3.00 w/cm².

14. You can set the treatment time by pressing the "min sec" button and then the up and down arrows on the touch screen display. You can choose from 1-30 minutes.

15. You can set the units for the display by pressing the w/cm² symbol next to the "0.00". Once selected pressing it additional times toggles between "w" and "w/cm²".

16. For ultrasound, plug the ultrasound applicator into the receptacle labeled "US". Plug the #4 electrode cable into "ch4".

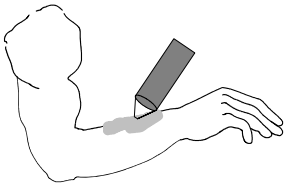
17. Wait for the "L" or "S" indicator to illuminate on the screen showing which applicator is in use.



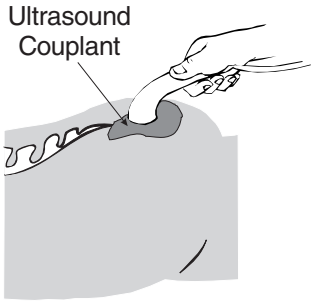
18. Plug red-tipped cable end into one electrode. If it is an original cord set #4, the red-tipped end will be marked with "Comb.".

19. Apply the dispersive electrode to the patient.

⚠WARNING Apply the dispersive electrode in such a manner to prevent transthoracic stimulation.

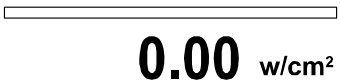


20. Apply a layer of ultrasound couplant gel to the treatment area.



21. Couple the applicator to the treatment area by keeping the entire surface of the applicator in contact with the gel that has been applied to the patient. This will ensure an efficient delivery of therapeutic ultrasound to the patient. Green LEDs on either side of the applicator will light when coupling is achieved after treatment is initiated.

22. Adjust the intensity level for the ultrasound. It will immediately go up to the level that was preset before treatment began.



23. If you hear an intermittent beeping sound, there is inadequate coupling to the patient. Reapply gel and start again. If the display never leaves zero and the bar doesn't darken, the couplant is not appropriate for ultrasound.

24. Adjust the intensity of Channel 4 stimulation so that it produces a comfortable tingling sensation. "Open Error" is defeated during combination therapy so that you can easily move the applicator during treatment. However, if contact is lost the output will go to zero and the timer will stop counting down.

and


25. The Channel 4 and Ultrasound buttons will blink while the treatment is active...

26. Pressing "Hold" on the control panel will stop output on all channels and on ultrasound, but will not reset the treatment parameters to their default values. Treatment time will also display remaining time on the timers.

4.17 Electrode Positioning

1. General information

   Placement of electrodes may be by the quadpolar, bipolar or monopolar techniques. Proper positioning and contact will insure treatment comfort and efficiency. Electrodes should never be placed in such a manner as to produce current flow through the cardiac area. For safe operation of the Sonicator Plus 940, review contraindications, warnings, precautions and Side Effects/Adverse Reactions in sections 5.6, 5.7, 5.9 and 5.10 before positioning electrodes.

2. Preparation of the skin prior to electrode application

   To insure the efficient current conduction necessary for proper treatment, certain preparations must be made. Cleaning or wetting should eliminate any impairment to current conduction on the patient's skin such as an oily or dry surface, or excessive hair coverage. Shaving may be necessary depending upon the density of hair coverage. **Failure to provide for maximum current conduction efficiency could result in skin irritation relating to an increase in current density at the electrode site.**

   Using reusable electrodes for longer periods of time than those recommended by the package insert could result in ineffective treatments or cause skin irritation. Care should be taken to ensure application of the total electrode surface area to the patient's skin prior to commencing treatment.

3. Quadpolar electrode application technique

   Quadpolar techniques should be used with the "Interferential" waveform. The electrodes from Channel 1 are placed diagonally from each other. While the electrodes from Channel 2 are placed diagonally across from each other to form an "X" over the treatment area. The zone of maximum interference between the two channels occurs roughly in the center of the "X".

   Constantly changing the intensity levels of the two channels will change the interference pattern felt by the patient. Pressing the amplitude modulation key will constantly change the intensity of the outputs of the two channels during treatment, increasing the area covered by the interference pattern.

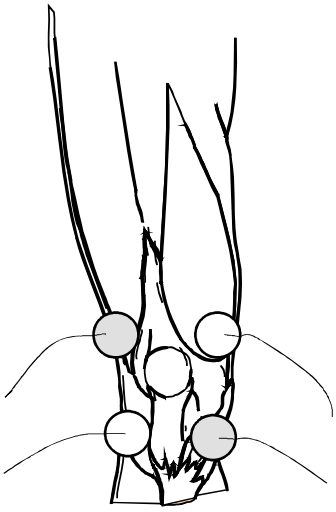


Figure 4.3—Quadpolar Electrode Placement Technique

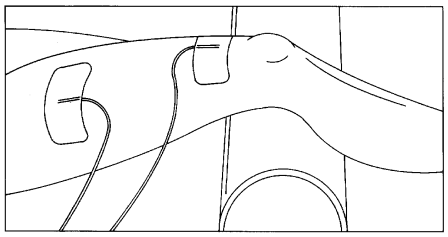


Figure 4.4—Bipolar Electrode Placement Technique

4. Bipolar electrode placement techniques

   Bipolar electrode placement techniques should be used to provide stimulation to larger muscle groups, such as the quadriceps or the hamstrings. The symmetrical waveforms of the "EMS" and "Russian" waveforms are usually applied to the body using the bipolar technique.

   Equal size electrodes are placed at each end of the muscle or muscle group. Current concentration is over the entire length of that muscle or muscle group and especially effective on weak musculature. Electrode placement should be at opposite ends of the limb or muscle group. Care should be taken to insure that electrodes are not placed too close together which could produce current concentration along the edges of the pads. This is the so-called "edging effect" which can cause patient discomfort. The figure on the left shows a pad set up for stimulation of the quadriceps.

5. Monopolar electrode application techniques

   Monopolar techniques may be used with the "High Voltage"and "TENS" waveforms. The smaller, active, electrode is placed over the muscle motor point. In treatments designed to relieve pain, the active electrode is placed over the painful area. The larger, dispersive, electrode is placed on the same side of the body at some point distal to the active electrode. The dispersive pad is generally three to four times larger than the active electrode so that current density is too low to cause muscle contractions under the dispersive electrode. Never place the dispersive electrode over the antagonist muscle.

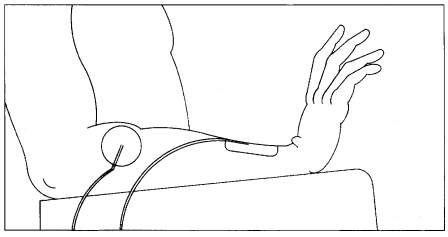


Figure 4.5—Monopolar Electrode Placement Technique

   The monopolar electrode placement technique has been found to be especially useful for muscle stimulation of the upper extremities and small muscle groups. This technique helps concentrate the stimulation effect on the muscle under the smaller electrode. The figure on the left illustrates one possible electrode placement for muscle stimulation of the forearm.

6. Additional information about electrode placement:

   Motor point charts are available as guides from Mettler Electronics Corp. These points may vary from patient to patient, and at time of injury, may vary in the same patient.

Section 5—Indications, Contraindications, Precautions and Adverse Reactions

5.1 Indications for Therapeutic Ultrasound

Application of therapeutic deep heat for the treatment of selected sub-chronic and chronic medical conditions such as;

1. Relief of pain, muscle spasms and joint contractures:
2. Relief of pain, muscle spasms and joint contractures that may be associated with:
   - Adhesive capsulitis
   - Bursitis with slight calcification
   - Myositis
   - Soft tissue injuries
   - Shortened tendons due to past injuries and scar tissues
3. Relief of pain, muscle spasms and joint contractures resulting from:
   - Capsular tightness
   - Capsular tightening

5.2 Indications for Pain Management

4-Pole Interferential, 2-Pole Interferential, TENS and Microcurrent waveforms

1. Symptomatic relief of chronic intractable pain
2. Post-traumatic pain
3. Post-surgical pain

5.3 Indications for Neuromuscular Stimulation

EMS, TENS, Hi Volt and Russian waveforms

1. Relaxation of muscle spasms
2. Increase local blood circulation
3. Prevention or retardation of disuse atrophy
4. Muscle re-education
5. Maintaining or increasing range of motion
6. Immediate post surgical stimulation of calf muscles to prevent venous thrombosis

5.4 Indications for Muscle Spasm

DC *(Direct Current)* waveform

1. Relaxation of muscle spasm

5.5 Contraindications for Therapeutic Ultrasound

1. Therapeutic ultrasound should not be applied over the pregnant or potentially pregnant uterus. Therefore, therapeutic ultrasound should not be applied over the uterus unless specific assurance can be attained from the patient that she is not pregnant.
2. Patients who have cardiac pacemakers should be protected from direct ultrasound exposure over the thorax to protect the lead wires and pacer from such exposure.
3. Therapeutic ultrasound should not be applied to the eye.
4. Applications of therapeutic intensities of ultrasound should be avoided over the heart.
5. Neoplastic tissues or space occupying lesions should not be exposed to ultrasound.

6. Ultrasound should not be applied to the testes to avoid increases in temperature.
7. Areas of thrombophlebitis should not be treated with therapeutic ultrasound due to the increased possibility of clotting or dislodging a thrombus. Conditions where this might occur are deep vein thrombosis, emboli and severe atherosclerosis.
8. Tissues previously treated by deep x–ray or other radiation should not be exposed to therapeutic ultrasound.
9. Ultrasonic treatment over the stellate ganglion, the spinal cord after laminectomy, subcutaneous major nerves and the cranium should be avoided.
10. Do not treat ischemic tissues in individuals with vascular disease where the blood supply would be unable to follow the increase in metabolic demand and tissue necrosis might result.
11. Do not apply therapeutic ultrasound over a healing fracture.
12. Ultrasound should not be applied over the epiphyseal areas (bone growth centers) of the bones of growing children.

5.6 Contraindications for Neuromuscular Electrical Stimulation

1. Electrical neuromuscular stimulation should not be administered to individuals who are or may be pregnant.
2. Do not stimulate a patient who has a cardiac demand pacemaker.
3. Patients with implanted electronic devices should not be subjected to stimulation.
4. Placement of electrodes across the chest laterally or anterior/posterior creates a possible hazard with cardiac patients and is therefore not recommended. Do not use transthoracically in any mode. Great care should be exercised in applying the electrical stimulus current to any region of the thorax because the stimulus current may produce cardiac arrhythmia. In patients with known heart disease, electrical stimulation should be used only after careful physician evaluation and patient instruction.
5. Place electrodes in such a way to avoid stimulation of the carotid sinus (neck) region.
6. Patients with arterial or venous thrombosis or thrombophlebitis are at risk of developing embolisms when electrical stimulation is applied over or adjacent to the vessels containing the thrombus. If a patient has a history of deep vein thrombosis, even many years past, the affected area should not be stimulated.
7. Do not use over swollen, infected, or inflamed areas. Do not place electrodes over skin eruptions.
8. Fresh fractures should not be stimulated in order to avoid unwanted motion.
9. Do not apply stimulation transcerebrally (through the head).
10. Do not use on cancer patients.
11. Stimulation should not be applied immediately following trauma or to tissues susceptible to hemorrhage.
12. Positioning electrodes over the neck or mouth may cause severe spasm of the laryngeal or pharyngeal muscles. These contractions may be strong enough to close the airway or cause difficulty in breathing.
13. Do not apply stimulation for undiagnosed pain syndromes, until etiology is established.
14. Do not apply electrodes directly over the eyes or inside body cavities.
15. Do not use electrical stimulation in conjunction with high frequency surgical equipment or microwave or shortwave therapy systems.

5.7 Warnings for Neuromuscular Electrical Stimulation

1. Electrical stimulation is ineffective for pain of central origin.
2. Electrical stimulation must be applied by a physician or other qualified practitioner and should be used for only the prescribed purposes.
3. Electrical stimulation is of no curative value.

4. Electrical stimulation is a symptomatic treatment and as such suppresses the sensation of pain, which could serve as a protective mechanism.
5. The safety of electrical stimulators for use on children has not been determined. Keep out of reach of children.
6. Electronic monitoring equipment (such as ECG monitors and ECG alarms) may not operate properly when electrical stimulation is in use.

5.8 Precautions for Therapeutic Ultrasound

1. Ultrasound should not be applied in areas of reduced sensation or circulation. Patients having reduced sensation will not be able to notify the practitioner of discomfort if ultrasound intensities are too high. Patients with compromised circulation may have an excessive heat buildup in the treatment area.
2. Operators should not routinely expose themselves to therapeutic ultrasound. The applicator handles for the Sonicator Plus 940 have been designed to allow the practitioner to perform underwater treatments without exposing the hands to ultrasound.
3. If a patient complains of periosteal pain (deep, achy pain) during ultrasonic treatment, intensity should be reduced to a comfortable level.
4. Any bleeding tendency is increased by heating because of the increase in blood flow and vascularity of the heated tissues. Care, therefore, should be used in treating patients with therapeutic ultrasound who have hemorrhagic diatheses or bleeding disorders.
5. Moving technique of the applicator should be used when applying therapeutic ultrasound at intensities greater than 0.5 W/cm² to assure even exposure of tissues to ultrasound.
6. Heating of the joint capsule in acute or subacute arthritis should be avoided.
7. Electric treatment tables or whirlpools which may come in contact with the patient during a treatment with the Sonicator Plus 940 should be adequately grounded and safety tested to insure safe operation with the Sonicator Plus 940.

5.9 Precautions for Neuromuscular Electrical Stimulation

1. Care should be taken in the treatment of patients receiving another type of electrotherapeutic treatment (such as conventional TENS) or having indwelling electrodes, lead wires, or transmitters (for electrophrenic pacing or cerebellar or urinary bladder stimulation). Stimulation currents should not cross the lead wires or electrodes.
2. It is advisable to insulate patients, preferably by use of a wooden treatment table or one that is completely padded by non–conductive material. Added safety is provided if the patient cannot touch any grounded metal parts.
3. Limit treatment intensity to 50 mA (50 V) or less, when using small electrodes (2" diameter), to reduce the chance of thermal burns due to high current density. Avoid current densities exceeding 2 mA/cm² when using this device.
4. Isolated cases of skin irritation may occur at the site of electrode placement following long–term application.
5. Avoid placing electrodes directly over open wounds since current density tends to concentrate in these areas.
6. Use extreme caution when treating desensitized areas or on patients who may not be able to report discomfort or pain.
7. Use caution in applying electrical stimulation over areas where there is a loss of normal skin sensation.
8. Adequate precautions should be taken in the case of persons with suspected or diagnosed epilepsy.
9. Patients should not be left unattended during any treatment.
10. Care should be taken following recent surgical procedures when muscle contraction may disrupt the healing process.
11. Do not apply electrical stimulation over the menstruating uterus.
12. The long–term effects of chronic electrical stimulation are unknown.

13. Electrode placement and stimulation settings should be based on the guidance of the prescribing practitioner.
14. Effectiveness for pain management is highly dependent upon patient selection by a person qualified in the management of pain patients.
15. The Sonicator Plus 940 should be used only with electrode cables and electrodes recommended for use by Mettler Electronics Corp.
16. Turn on the Sonicator Plus 940 before applying electrodes to the patient.

5.10 Side Effects/Adverse Reactions for Neuromuscular Electrical Stimulation

1. Skin irritation and burns beneath the electrodes have been reported with the use of electrical muscle stimulators.
2. Possible allergic reactions to tape, gel or electrodes may occur.

Section 6—Maintenance and Troubleshooting

6.1 Cleaning the Sonicator Plus 940

1. The Sonicator Plus 940 can be wiped off with a damp cloth. The power cord should be disconnected from the unit before this is done. In the case of stubborn dirt a gentle household cleaner can be sprayed on the cloth and then wiped on the unit. If this method is used, remove any cleaner residue with a damp cloth. Do not spray cleaner into the vents of the unit.
2. Follow the V Trode package insert for the use and care of the electrodes supplied with the Sonicator Plus 940.
3. For routine cleaning of the electrode cables use soap and water. Thoroughly dry after cleaning.
4. Use soap and water for routine cleaning of the Sonicator Plus 940 applicator. Rinse the applicator thoroughly after disinfection to remove any residue. You can disinfect the stainless steel part of ultrasound applicator, with a cloth moistened with an approximately 70% alcohol solution. The Sonicator Plus 940 applicator *is neither autoclavable nor* gas sterilizable.

6.2 Routine Maintenance

1. To assure accurate performance of the Sonicator Plus 940, calibration verification of ultrasonic output should be performed on an annual basis. Refer to the Maintenance Manual for guidance on this procedure.
2. Standard medical electrical safety checks should be performed annually by qualified biomedical engineers or technicians trained to perform these procedures.
3. Inspect electrode cables and associated connectors for damage.
4. Inspect ultrasound applicator for cracks, since they may allow ingress of conductive fluid(s). The ultrasound probe is waterproof and should never be disassembled, since doing so may degrade its waterproofing or the performance of the transducer, resulting in electric shock. (IPX7)
5. Inspect the applicator cable and its connector for damage.
6. The applicator is an integral part of delivering safe and effective therapeutic ultrasound. Avoid rough handling of the ultrasound applicator since it is relatively fragile and can be damaged if dropped or otherwise abused.
7. Never open the Sonicator Plus 940. Doing so may lead to malfunctions or accidents.
8. Do not damage, break, modify, bend forcibly, tug on, twist, or bundle the electrode cord. If a heavy object is placed on the cord or it is pinched or modified, the cord may be damaged, resulting in fire, electric shock, or other accident.
9. When cleaning the unit, do not wipe using paint thinner, gasoline, kerosene, polishing powder, hot water, or chemicals to prevent discoloration of the main unit and probes. Wipe with a cloth soaked in cold water or lukewarm water and forcefully wrung.
10. If you plan to use a unit that has been left standing for some time, always check to ensure that the unit functions normally and safely.

6.3 Troubleshooting the Sonicator Plus 940

Symptom	Action
1. Nothing lights when main power switch is turned on.	Is line cord connected to outlet? Does the outlet have power? Unit may require servicing if none of the above resolves the problem.
2. **! OPEN ERROR**	Appears when a current flow is interrupted (e.g., an electrode is detached from the treatment area). Check the electrode cable connections to make sure that they are connected. Make sure both electrodes are attached to the cables and to the patient. Try fresh electrodes and or cables to resolve this problem. Press either the error message or "Stop" to reset the treatment after checking the electrodes. Then readjust the treatment intensity by pressing the "Up" arrow to begin the treatment again.
3. **! DIFF. ERROR**	Appears when the current level spikes (e.g., the electrode is partly detached from the treatment area or moved out of position). Reattach the electrodes firmly. Press either the error message or "Stop" to reset the treatment after resolving the cause of the error. Then readjust the treatment intensity by pressing the "Up" arrow to begin the treatment again.
4. **! PROBE ERROR**	Appears when a problem occurs in the ultrasound applicator. Check the ultrasound applicator for damage and replace if necessary. Make sure that it is firmly connected to the Sonicator Plus 940. Press either the error message or "Stop" to reset the treatment after resolving the cause of the error. Then readjust the treatment intensity by pressing the "Up" arrow to begin the treatment again.
5. ! CONNECTION ERROR	Appears when an internal connection is disconnected or similar problem has occurred. Remove the electrodes from the patient. Turn off power, then turn back on. If the error is not resolved, the Sonicator Plus 940 requires servicing.

If problem is not addressed above, or if additional troubleshooting guidance is desired, call (800) 854-9305 or email our service department at *service@mettlerelectronics.com*.

The distributor who sold the Sonicator Plus 940 should be able to assist you with a loaner unit during warranty service.

Section 7—Ultrasound Theory of Operation

7.1 Introduction to Ultrasound

Ultrasound is a form of acoustical vibration occurring at frequencies too high to be perceived by the human ear. The limit for the audible range is at about 20 kHz. Frequencies above this level are considered ultrasound. The range 700 kHz to 1.1 MHz appeared during early investigative work to be best suited to clinical applications. Most therapeutic ultrasound devices operate at frequencies within this range. Recent studies have been conducted utilizing a frequency of 3 MHz. Since 3 MHz allows ultrasound transmission only 1/3 the depth of 1 MHz, it has been used for the treatment of more superficial structures.

Figures 7.1, 7.2, 7.3 and 7.4 illustrate the relative depths of penetration of 1 and 3 MHz. Since the body is actually composed of a variety of tissues, the depth of penetration will depend on the amount of each tissue in the path of the ultrasound beam. Quite frequently, the presence of bone in the ultrasound beam will be the limiting factor in determining the actual depth to which the ultrasound beam will reach. This is best illustrated in Figure 7.4. In the fingers and toes, ultrasound can pass around the bone to the opposite surface of the digit. In this case, if the intensity is high enough, the patient may report heat or discomfort on the surface opposite the ultrasound application.

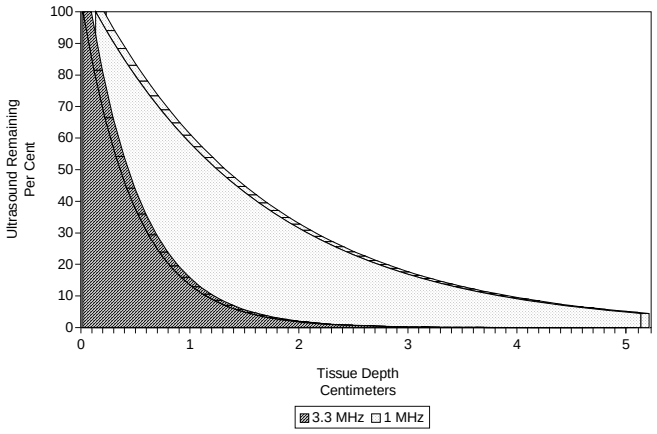


Figure 7.1—Ultrasound Absorption, Skin

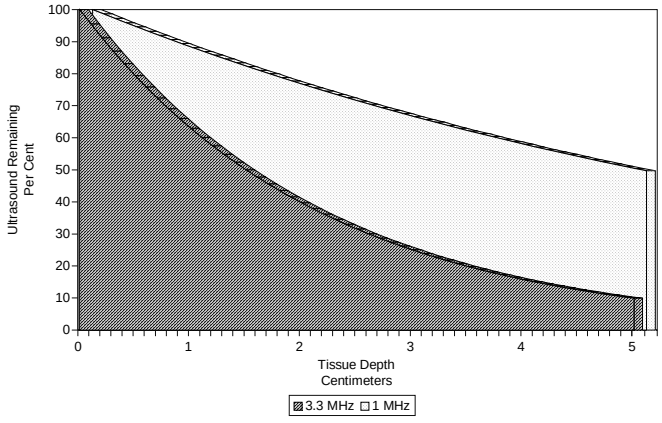


Figure 7.2—Ultrasound Absorption, Fat

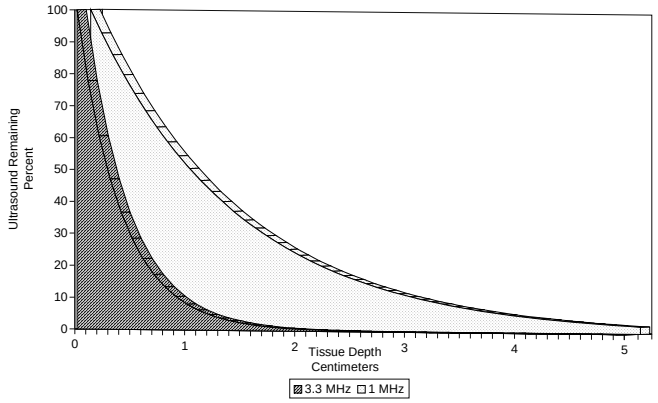


Figure 7.3—Ultrasound Absorption, Muscle with the Ultrasound Beam Perpendicular to the Muscle Fibers

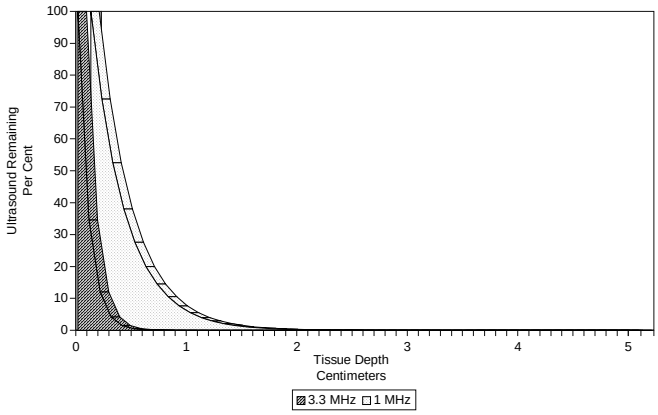
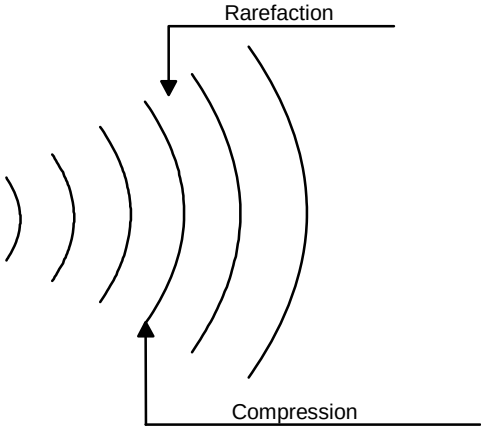


Figure 7.4—Ultrasound Absorption, Bone

The physics of ultrasound and audible sound are similar, except for frequency. Both travel as longitudinal waves through a conducting medium. Ultrasound waves can be propagated in a gaseous, liquid, or solid medium, but not in a vacuum.



Areas of compression and rarefaction of the molecules form high frequency sound waves. Ultrasound exhibits certain beaming properties and can be reflected, refracted, scattered or absorbed. In passing through media, it is attenuated and the absorbed energy is transformed into heat. The attenuation coefficient for longitudinal waves in liquid and soft tissues is high, producing the phenomenon at bone surfaces known as selective heating.

Figure 7.5—High Frequency Sound Waves

Clinical ultrasound is produced through the reverse piezoelectric effect. Electricity is carried from a radio frequency source to an electrode in contact with the surface of a specially cut crystal. The electrical charges applied to the crystal surface produce mechanical vibrations, or the so-called reverse piezoelectric effect.

The crystal may be natural or synthetic and may be salt, quartz, polycrystalline or ceramic. When this crystal is in resonance with the driving oscillator, optimum conversion from electrical to mechanical energy is achieved. The Sonicator Plus 940 uses a silicon dioxide (SiO_2 ceramic for its transducers.

Ultrasonic power is expressed in watts (W), or watts per square centimeter (W/cm²). Average intensity (W/cm²) is obtained by measuring the total output of the applicator (in watts) and then dividing it by the size of the effective radiating area of the applicator. The ERA (effective radiating area) is indicated on the label of each Mettler applicator. Please note: the ERA is different from the overall dimension of the applicator face.

Ultrasound waves need a medium for their transmission and that is accomplished by using a proper coupling agent. This coupling layer between the transducer and body surface will assist in the propagation of the mechanical vibrations and prevent loss of transmission.

Once the coupling agent is applied to the body surface, the applicator placed in contact and the desired output selected in total watts, or watts per square centimeter, the technique of application is by means of circular or stroking movement. In the circular method, the sound head of the applicator is moved in slow and circular overlapping movements. In the stroking, or "paintbrush" method, slow back and forth strokes are used, again with slight overlapping. Motion with either technique should be slow enough to insure proper energy absorption yet fast enough to eliminate excessive amounts of absorption that could produce periosteal pain. Some references recommend that the treatment area covered by this moving technique be two to three times the effective radiating area of the transducer for every five minutes of exposure.

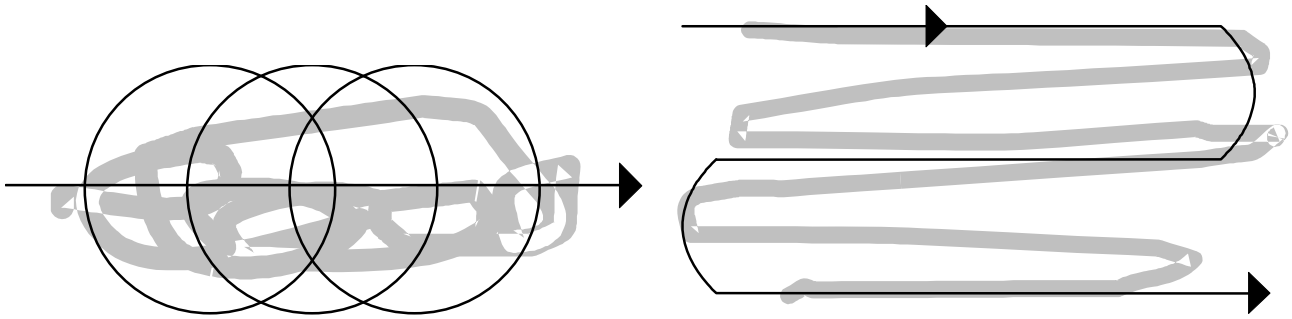


Figure 7.6—Ultrasound Application Techniques

On occasion, irregular surfaces of the body are treated (hands) and may offer a poor surface for proper sound head contact. The underwater technique may be used for these applications. The part to be treated and the sound head are submerged in water and the sound head is moved over the area, keeping the head ½ to 1 inch away from the area of treatment. As air bubbles appear on the surface of the sound head they should be wiped away to insure proper transmission of energy.

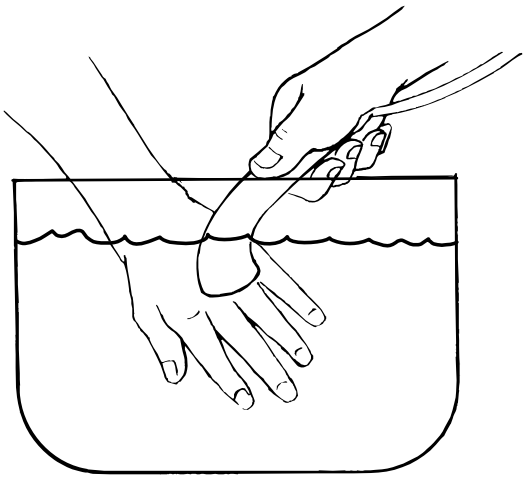


Figure 7.7 Underwater Treatment Technique

Section 8—References

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This manual has been written as a guideline for the correct use of the Sonicator Plus 940. Reading the above references will provide a more complete understanding of the correct use of therapeutic ultrasound, neuromuscular stimulation and combination therapy.

Section 9—Specifications

9.1 General Specifications:

Input:	120 V ~ 60 Hz, 85 VA
Certification:	The Sonicator Plus 940 complies with the ultrasound performance standards set forth in the Code of Federal Regulations, Title 21 (Food and Drugs), Part 1050.10
ETL and C-ETL Listed:	Model ME 940
Weight:	11 pounds
Dimensions:	4.9 in (H) x 13.6 in (W) x 10.5 in (D)
Operating Temperature:	+50°F to +104°F
Humidity:	Operating, 30% to 75% Relative Humidity at 104°F Nonoperating, 5 to 95% Relative Humidity, non-condensing
Storage Temperature:	-40°F to 167°F
Timer Accuracy:	± 3%
Maximum Treatment Time:	60 minutes–electrical stimulation 30 minutes–ultrasound or combination therapy
Treatment Timer:	Treatment time counts down to zero. The digital timer indicates time in minutes and seconds. The timer also indicates the remaining treatment time during the "Hold" period.

9.2 Ultrasonic Generator Specifications:

Frequency:	1.0 MHz ±5% 3.0 MHz ±5%
Modes:	Continuous Pulsed—5, 10, 20, 30, 40 and 50% duty cycle
Pulse Repetition Rate:	100 Hz ±20%
Pulse Duration:	0.5, 1, 2, 3, 4 and 5 msec ±20%
Temporal Peak/ average intensity ratio:	20:1, 10:1, 5:1, 3.3:1, 2.5:1 and 2:1 ±10%
Maximum output power:	11 W (100%) with large applicator, 1 MHz, (ME 9401) 16.5 W (pulsed) with large applicator, 1 MHz, (ME 9401) 12 W (100%) with large applicator, 3 MHz, (ME 9401) 18 W (pulsed) with large applicator, 3 MHz, (ME 9401) 1.8 W (100%) with small applicator, 1 or 3 MHz, (ME 9402) 2.7 W (pulsed) with small applicator, 1 or 3 MHz, (ME 9402)
Maximum intensity:	2.0 W/cm² (100%) 3.0 W/cm² (pulsed mode)
Indication accuracy:	±20% (for any level above 10% of maximum)

Output description:

The output waveform is continuous or pulsed as programmed by the membrane panel control. In the pulse mode the 1 or 3 MHz sine wave pulses are modulated. The power level is adjusted by varying the pulse amplitude. The pulse waveform shown below represents all the available pulsed options. The frequency remains the same while the on and off times vary.

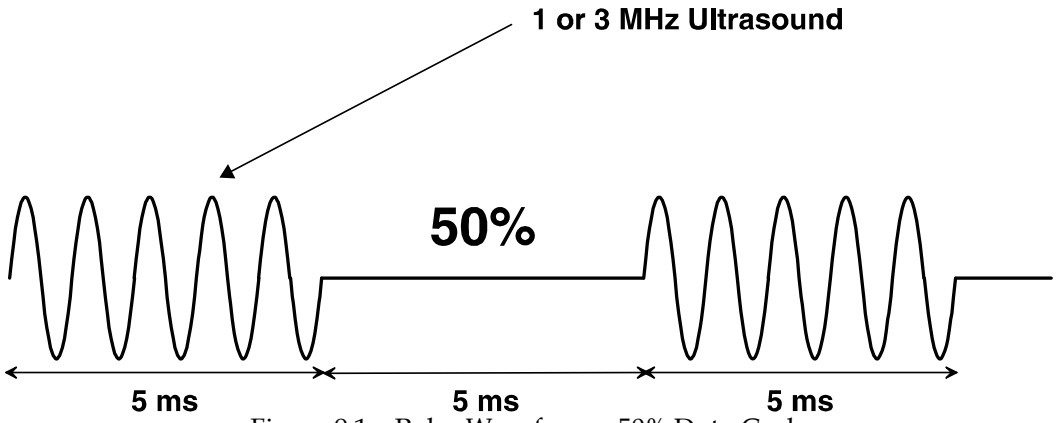

Figure 9.1—Pulse Waveform—50% Duty Cycle

In the continuous mode, the power is on at least 95% of the time the timer is running. The continuous mode waveform is shown below:

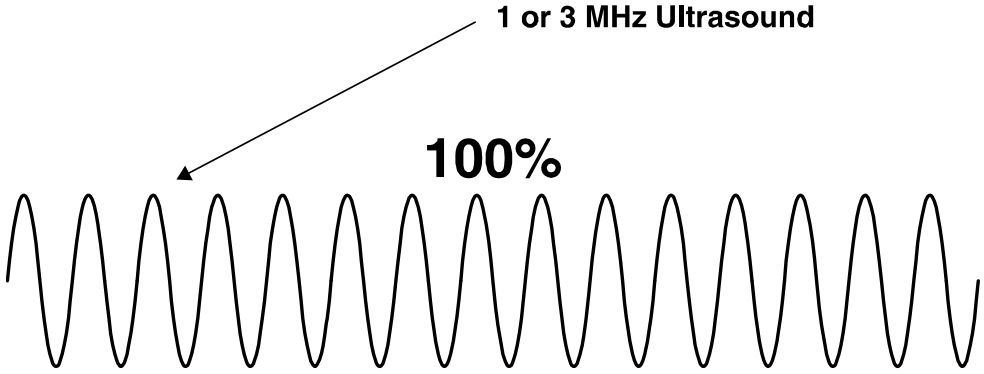

Figure 9.2—Continuous Waveform

9.3 Ultrasonic Applicator Specifications:

Individual Applicator Specifications:

Applicator Part Number	Frequency	Effective Radiating Area	Maximum Beam Non-Uniformity Ratio	Type
ME 9401	1 MHz ±5%	5.5 cm² ±20%	4.6:1	Collimated
ME 9401	3 MHz ±5%	6.0 cm² ±20%	4.2:1	Collimated
ME 9402	1 MHz ±5%	0.9 cm² ±20%	4.7:1	Divergent
ME 9402	3 MHz ±5%	0.9 cm² ±20%	4.7:1	Collimated

Spatial Pattern:

The applicator produces a collimated (cylindrical) beam with an area listed, measured 5 mm from the ceramic disc surface when the radiation is emitted into the equivalent of an infinite medium of distilled water at 30° C.

The beam of the applicator is circular in all planes parallel to the applicator face. A few inches from the face, it is a single smooth bell-shaped curve. Nearer the face the pattern varies more due to phase cancellations. Sample curves measured in the far field from the surface are shown in Figures 9.3 through 9.6.

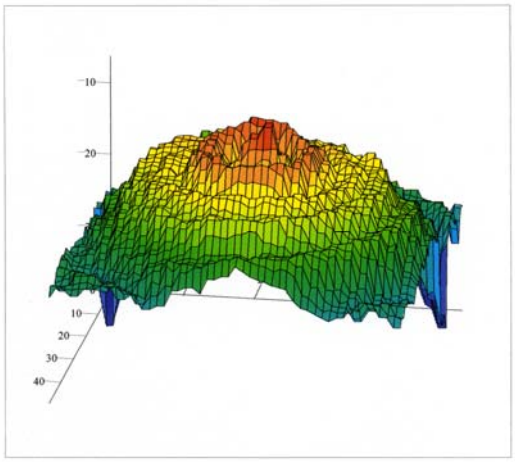

Figure 9.3—Large Applicator (1 MHz), ME 9401—Three Dimensional Beam Pattern

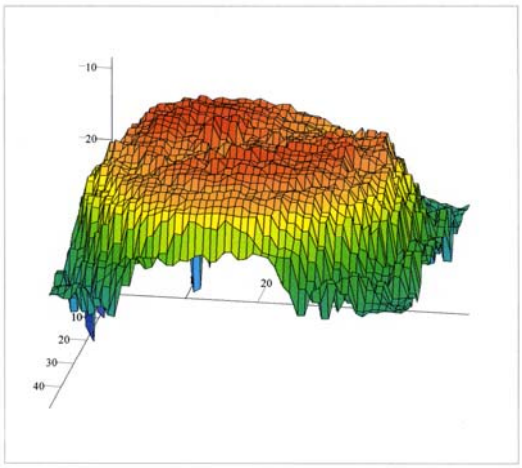

Figure 9.4—Large Applicator (3 MHz), ME 9401—Three Dimensional Beam Pattern

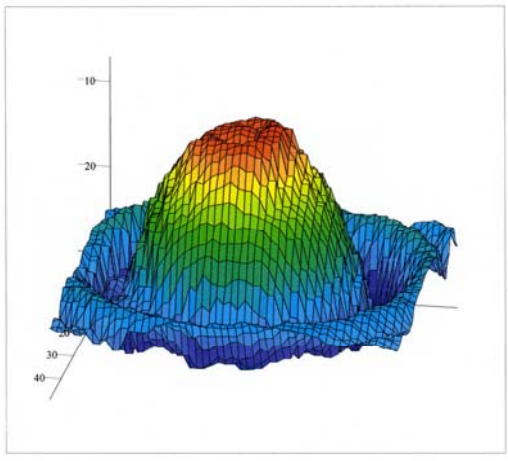

Figure 9.5—Small Applicator (1 MHz), ME 9402—Three Dimensional Beam Pattern

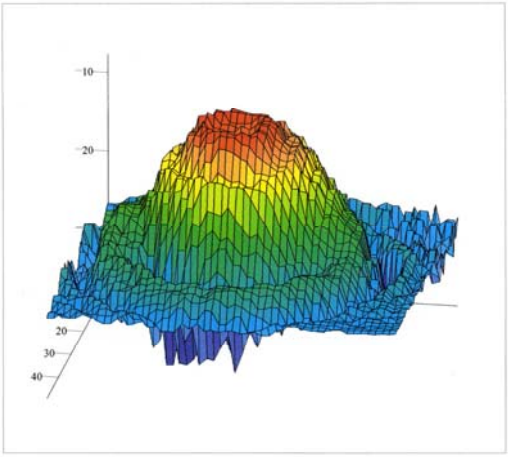

Figure 9.6—Small Applicator (3 MHz), ME 9402—Three Dimensional Beam Pattern

9.4 Waveform Specifications:

4-Pole Interferential Mode

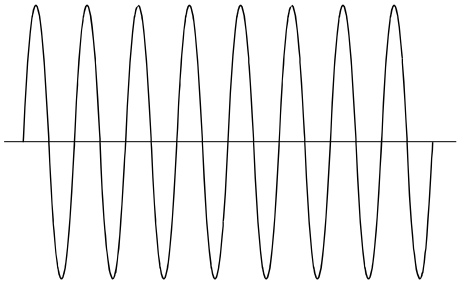

Figure 9.7—4-Pole Interferential Waveform

Waveform Type:	Sinewave
Polarity:	None
Maximum Voltage:	50 V ±20% (Peak value, 500Ω load)
Current:	0–100 mA peak, 500Ω load
Carrier Frequency:	2 kHz, 4 kHz, 5 kHz
Interference frequency	1~250 beats
Frequency Modulation:	1 to 10 in 1-beat steps, and 10 to 250 in 10-beat steps. *(For Sweep: Min. frequency → Max. frequency)*
Vector sweep angle:	0, 15, 30, 45 degrees
Available Channels:	Channels 1 & 2 or 3 &4

2-Pole Interferential (Premodulated)

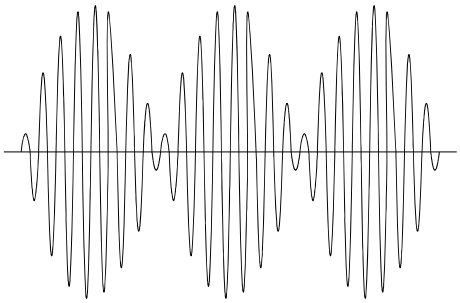

Figure 9.8—2-Pole Interferential Waveform

Waveform Type:	Amplitude modulated sine wave
Polarity:	None
Maximum Voltage:	50 V ±20% (Peak value, 500Ω load)
Current:	0–100 mA peak, 500Ω load
Carrier Frequency:	2 kHz, 4 kHz, 5 kHz
Interference frequency	1~250 beats
Frequency Modulation:	1 to 10 in 1-beat steps, and 10 to 250 in 10-beat steps. *(For Sweep: Min. frequency → Max. frequency)*
Available Channels:	All

EMS Mode

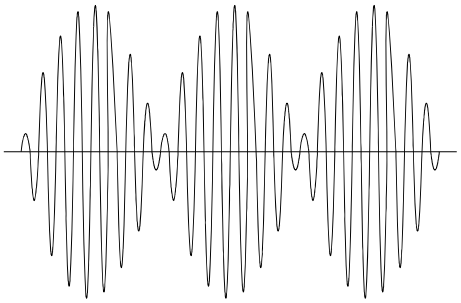

Figure 9.9—EMS Waveform

Waveform Type:	Amplitude modulated sine wave
Polarity:	None
Maximum Voltage:	50 V ±20% (Peak value, 500Ω load)
Current:	0–100 mA peak, 500Ω load
Carrier Frequency:	2 kHz, 4 kHz, 5 kHz
Interference frequency	20 to 250 beats in 10 beat steps
Amplitude Modulation Options:	Independent, Simultaneous, Alternate
On-time	1 to 30 sec (In 1-sec steps)
Off-time	1 to 99 sec (In 1-sec steps)
Ramp-up Time	0 to 3 sec (In 0.5-sec steps)
Hold Time	0 to 30 sec (In 0.5-sec steps)
Ramp-down time	0 to 3 sec (in 0.5-sec steps)
Contraction	1 to 999 times
Available Channels:	All, (1 & 2 or 3 & 4 for simultaneous or alternate)

Russian Mode

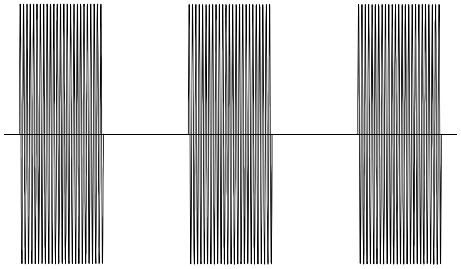

Figure 9.10—Russian Waveform

Waveform Type:	Burst modulated sine wave
Polarity:	None
Maximum Voltage:	50 V ±20% (Peak value, 500Ω load)
Current:	0–100 mA peak, 500Ω load
Frequency:	2500 Hz, Burst at 10 ms on and 10 ms off
Available Amplitude Modulation Options:	Independent, Simultaneous, Alternate
On-time	1 to 30 sec (In 1-sec steps)
Off-time	1 to 99 sec (In 1-sec steps)
Ramp-up Time	0 to 3 sec (In 0.5-sec steps)
Hold Time	0 to 30 sec (In 0.5-sec steps)
Ramp-down time	0 to 3 sec (in 0.5-sec steps)
Contraction	1 to 999 times
Available Channels:	All, (1 & 2 or 3 & 4 for simultaneous or alternate)

Hi Volt Mode

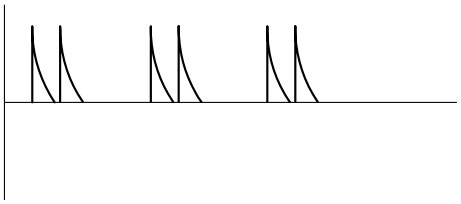

Figure 9.11— Hi Volt Waveform

Waveform Type:	Monophasic twin peak
Polarity:	Positive, negative or both
Voltage:	0 to 150 V (Peak value, 500Ω load)
Maximum Current:	300 mA peak, (Peak value, 500Ω load)
Phase Duration:	10 to 80 µs (In 10-µs steps)
Frequency:	Constant：0.5 to 200 Hz Burst: 60 Hz (Fixed) Sweep：1 to 200 Hz Independent, Simultaneous,

	Alternate: 20 to 200 Hz
Frequency Modulation:	Constant, Burst, Sweep
Burst frequency *2	0.5 to 7 Hz (0.5, 0.7 Hz, 1 to 7 Hz (In 1-Hz steps)).
Available Amplitude Modulation Options:	Independent, Simultaneous, Alternate
On-time *1	1 to 30 sec (In 1-sec steps)
Off-time *1	1 to 99 sec (In 1-sec steps)
Ramp-up time *1	0 to 3 sec (In 0.5-sec steps)
Hold time *1	0 to 30 sec (In 0.5-sec steps)
Ramp-down time *1	0 to 3 sec (In 0.5-sec steps)
Contraction *1	1 to 999 times
Available Channels:	All, (1 & 2 or 3 & 4 for simultaneous or alternate)

*1: May be set only in Independent, Simultaneous, or Alternate mode.

*2: This frequency to be set only in Burst mode.

TENS Mode

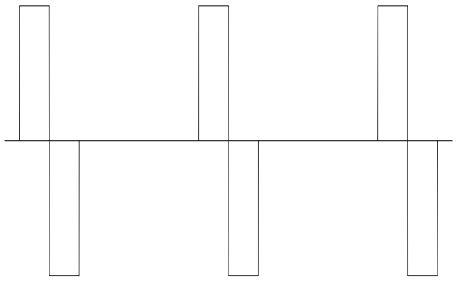

Figure 9.12—TENS Waveform

Waveform Type:	Biphasic square
Polarity:	None
Maximum Voltage:	50 V ±20% (Peak value, 500Ω load)
Current:	0 –100 mA peak, 500Ω load
Phase Duration:	50 to 300 µs (In 10-µs steps)
Frequency:	Constant : 0.5 to 250 Hz Burst: 100 Hz (Fixed) Sweep : 1 to 250 Hz Independent, Simultaneous, Alternate: 20 to 250 Hz
Frequency Modulation:	Constant and Sweep
Burst frequency *2	0.5 to 7 Hz (0.5, 0.7 Hz, 1 to 7 Hz (In 1-Hz steps)).
Available Amplitude Modulation Options:	Burst, Independent, Simultaneous, Alternate
On-time *1	1 to 30 sec (In 1-sec steps)
Off-time *1	1 to 99 sec (In 1-sec steps)
Ramp-up time *1	0 to 3 sec (In 0.5-sec steps)
Hold time *1	0 to 30 sec (In 0.5-sec steps)
Ramp-down time *1	0 to 3 sec (In 0.5-sec steps)
Contraction *1	1 to 999 times
Available Channels:	All, (1 & 2 or 3 & 4 for simultaneous or alternate)

*1: May be set only in Independent, Simultaneous, or Alternate mode.

*2: This frequency to be set only in Burst mode.

Microcurrent Mode

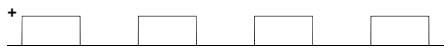

Figure 9.13—Microcurrent Waveform

Waveform Type:	Mono- or Bi-phasic square
Polarity:	Plus, minus or both
Maximum Voltage:	0.4 V ±20% (Peak value, 500Ω load)
Current:	0 to 750 µA peak, 500Ω load
Phase Duration:	Duty fixed at 50%
Frequency:	0.3 to 400 Hz
Available Channels:	All

Direct Current Mode

Waveform Type:	Continuous DC
Polarity:	Plus or minus
Maximum Voltage:	10 V ±20% (500Ω load)
Current:	0 to 20 mA peak, 500Ω load
Available Channels:	All

Section 10—Accessories

10.1 Ordering Information:

Therapy products and accessories are available from Mettler Electronics authorized Distributors. For information regarding either Mettler products or a distributor near you, please call toll free, (800) 854–9305 or phone (714) 533–2221 in areas outside the continental United States. Ask for Customer Service. Mettler Electronics is open from 7 AM until 5 PM Pacific Time for your convenience. You can also reach our Customer Service Department via email at *mail@mettlerelectronics.com*.

10.2 Sonicator Plus 940 Accessories

Catalogue #	Item Description
1844	Sonigel—salt free colloidal water couplant, case of 12, 9.5 oz. tubes
1851	Sonigel clear gel couplant, (12 x 250 ml)
1852	Sonigel clear gel couplant, (1 x 5 liters)
1853	Sonigel clear gel couplant, (4 X 5 liters)
1860	Sonigel clear gel couplant in tubes for therapeutic ultrasound and muscle stimulation, (4 cases of 12 x 9.5 oz. tubes)
1861	Sonigel clear gel couplant in bottles for therapeutic ultrasound and muscle stimulation, (4 cases of 12 x 250 ml bottles)
1863	Sonigel Lotion with Aloe Vera, 1 gallon with pump and pour off bottle
1864	Sonigel Lotion with Aloe Vera, 4 X 1 gallon individually packaged
2000	4 Sponge electrodes (2" x 2")
2001	24 Sponge inserts (2" x 2")
2002	4 Sponge electrodes (4" x 4")
2003	24 Sponge inserts (4" x 4")
2004	1 Sponge electrode (3.5" x 7")
2005	12 Sponge inserts (3.5" x 7")
2006	1 Sponge electrode (8" x 10")
2007	12 Sponge inserts (8" x 10")
2008	4 Electrode straps (24")
2009	4 Electrode straps (48")
2027	Pin to banana adapter plug set to be used with ME 2260 or 2201 electrode cables. Four each, gray.
2221	EZ Trode – 2" diameter round self–adhering, reusable electrodes with lead wires; case of ten packages (four electrodes/pkg.)
2222	EZ Trode – 3" diameter round self–adhering, reusable electrodes with lead wires; case of ten packages (four electrodes/pkg.)
2223	EZ Trode – 2" x 5" self–adhering, reusable electrodes with lead wires, case of 10 packages (2 electrodes/pkg.)
2224	EZ Trode – 2" square self–adhering, reusable electrodes with lead wires; case of ten packages (four electrodes/pkg.)
2266	Electrode cable for the Sonicator Plus 940

2267	Optional high volt / DC probe, pin-to-banana adapter and 3 ½" x 7" sponge electrode for the Sonicator Plus 940
2702	V Trode –2" diameter round electrodes with lead wires, case of ten packages (four electrodes/pkg.)
2703	V Trode –2.75" diameter round electrodes with lead wires, case of 10 packages (four electrodes/pkg.)
2704	V Trode –2" x 4" oval electrodes with lead wires, case of 10 packages (four electrodes/pkg.)
2705	V Trode –2" square electrodes with lead wires, case of 10 packages (four electrodes/pkg.)
73	Three-shelf mobile cart for all Sonicator Plus products. Holds unit on the top shelf with lower shelves for accessories.
74	Rugged plastic cart features three shelves and large lockable wheels.
75	Model 74 cart with a built-in hospital-grade surge protector to plug-in up to three pieces of equipment.
97	Sturdy stainless steel cabinet with a platform for Mettler electrotherapy products and three shelves with a plastic door with two locking wheels.
9401	Sonicator Plus 940, applicator (~5.5 cm^2/ 1 or 3 MHz)
9402	Sonicator Plus 940 applicator (0.9 cm^2/ 1 or 3 MHz)
9906	Sonicator Plus 940 Pocket Guide