Sonicator® Plus 994 Specifications

General Specifications:

Input:	90–240 VAC, 50–60 Hz, 2.3 Amp. Nom.
Certification: *Domestic model*	The Sonicator Plus 994 complies with the ultrasound performance standards set forth in the Code of Federal Regulations, Title 21 (Food and Drugs), Part 1050.10 and IEC 601-2-5, 1st Ed., 1984
ETL and C-ETL Listed: *Domestic model*	Model ME 994 (9801427)
Classification: *CE model*	Protective Class I Equipment Type BF Equipment Enclosed equipment without protection against ingress of water. Equipment not suitable for use in the presence of a flammable anesthetic mixture with air or with nitrogen oxide
Year 2000 Compliant	Yes
U.S. Patent Numbers:	U.S. and foreign patents applied for and granted including U.S. Patent Numbers 4,966,131 and 5,095,890.
Weight:	10.7 pounds 4,9 kg
Dimensions:	5 in (H) x 14.5 in (W) x 10 in (D) 12.7 cm (H) x 36.8 cm (W) x 25.4 cm (D)
Operating Temperature:	+50°F to +104°F +10°C to +40°C
Humidity:	Operating, 30% to 75% Relative Humidity at 104°F (40°C) Nonoperating, 5 to 95% Relative Humidity, non-condensing
Storage Temperature:	-40°F to 167°F -40°C to 75°C
Storage Humidity:	Storage, 30% to 90% Relative Humidity at 40º C, Non-condensing
Storage Pressure:	700-900 mB
Environmental Disposal:	The device contains lead in the form of solder used to produce electrical contact between components. To avoid adverse environmental impact, utilize a disposal facility that performs complete incineration of the device at a temperature in excess of 1000°C. The shipping materials are fabricated of cardboard and may be disposed of with other paper products.

Treatment timer:	
Timer Accuracy:	±0.5 minutes for times less than 5 minutes ±10% for times from 5 to 10 minutes ±1.0 minute for times greater that 10 minutes ±5%, *CE specification*
Maximum Treatment Time:	60 minutes–electrical stimulation 30 minutes–ultrasound or combination therapy
Treatment Timer:	Treatment time counts down to zero when a time is set, or up to 60 or 30 minutes when no time is set. The digital timer indicates time in minutes and seconds. The timer also indicates the remaining or elapsed treatment time during the "Hold" period.

Ultrasonic Generator Specifications:

Frequency:	1.0 MHz ±5% 3.2 MHz ±5% 3.3 MHz ±5%
Modes:	Continuous Pulsed—20% duty cycle Pulsed—50% duty cycle
Modulation:	100%
Modulation Waveform:	Rectangular
Pulse Repetition Rate: *Modulation Frequency*	100 Hz ±20%
Pulse Duration: *Modulation Period*	2 msec ±20%, 20% duty cycle 5 msec ±20%, 50% duty cycle
Temporal Peak/ average intensity ratio:	5:1 ±20%, 20% duty cycle 2:1 ±20%, 50% duty cycle
Maximum output power:	22 W with a 10 cm^2 applicator, (ME 7310) 11 W with a 5 cm^2 applicator, (ME 7513) 2.2 W with a 1 cm^2 applicator (ME 7331)
Maximum intensity:	2.2 W/cm^2 with all applicators
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, 3.2 or 3.3 MHz square wave pulses are modulated. The power level is adjusted by varying the pulse amplitude. The pulse waveforms are shown below:

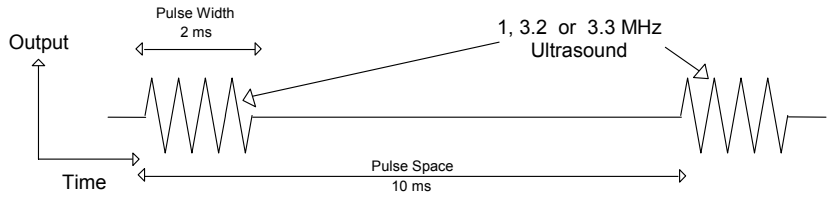

Figure 3.1—Pulse Waveform—20% Duty Cycle

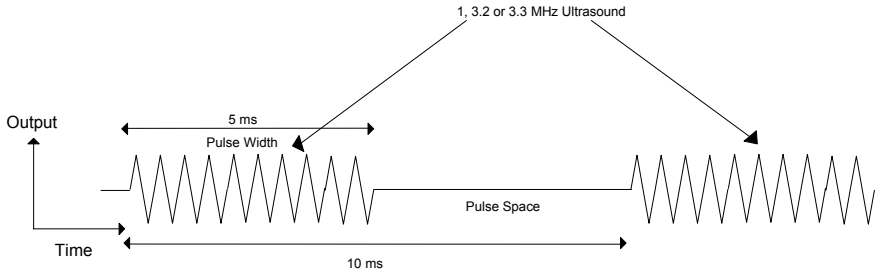

Figure 3.2—Pulse Waveform—50% Duty Cycle

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:

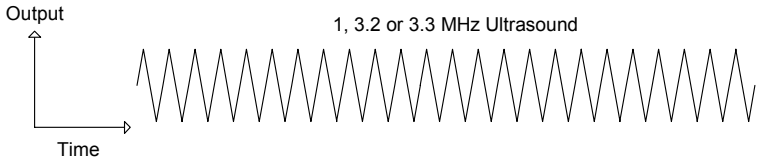

Figure 3.3—Continuous Waveform

Ultrasonic Applicator Specifications:

Piezoelectric discs: The output transducer utilizes a barium titanate disc with a specially coated face.

Individual Applicator Specifications:

Applicator Part Number	Frequency	Effective Radiating Area
ME 7310	1 MHz ±5%	10 cm²±10%
ME 7331	3.3 MHz ±5%	1 cm² ±10%
ME 7513	1 or 3.2 MHz ±5%	5 cm² ±10%

Maximum Beam Non–Uniformity Ratio: 6:1

Maximum Effective Intensity Ratio: 2:1

Spatial Pattern: The applicator produces a collimated (cylindrical) beam with an area of 1, 5 or 10 cm^2, 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 3.3, 3.4, 3.5 and 3.6.

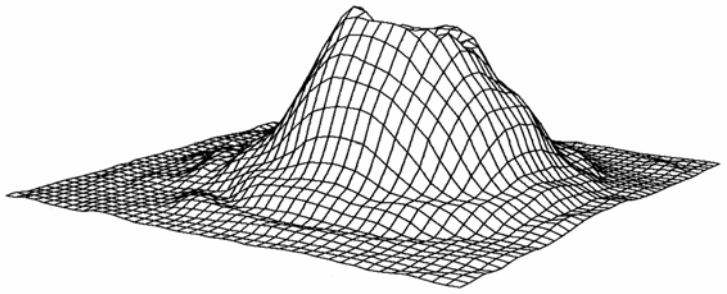

Figure 3.4—10 cm² Applicator (1 MHz), ME 7310,—Three Dimensional Beam Pattern

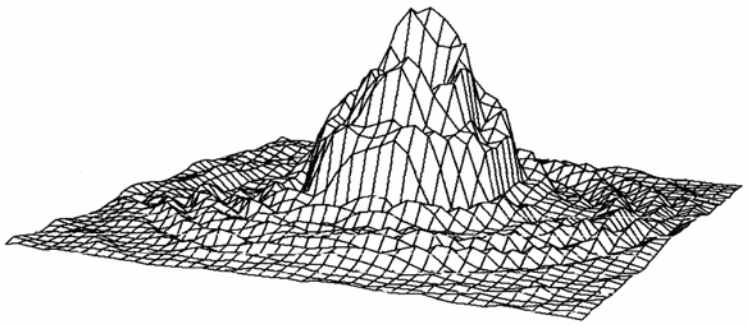

Figure 3.5—5 cm² Applicator (1 MHz), ME 7513—Three Dimensional Beam Pattern

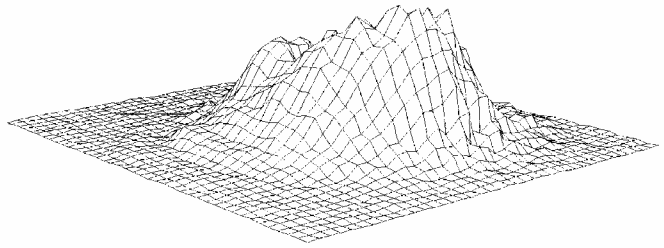

Figure 3.6—5 cm² Applicator (3.2 MHz), ME 7513—Three Dimensional Beam Pattern

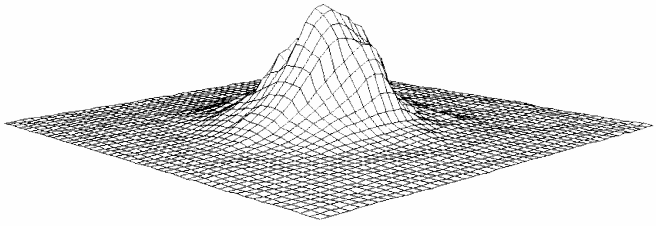

Figure 3.7—1 cm² Applicator (3.3 MHz), ME 7331—Three Dimensional Beam Pattern

Waveform Specifications:

Interferential Mode

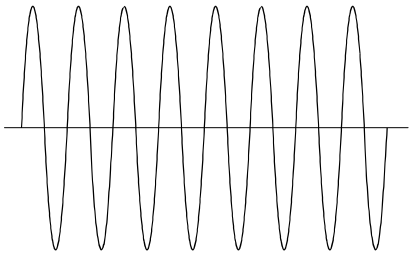

Figure 3.8—
Interferential Waveform

Waveform Type:	Sinewave
Polarity:	None
Volts:	0–65 volts RMS, 1 Kohm load
Current:	0–65 mA RMS, 1 Kohm load
Average current at maximum intensity and frequency:	65 mA RMS
Maximum current density under 2" diameter electrode.	3.2 mA/cm²
Frequency:	Channel 1 = 4000 Hz Channel 2 = 4000 to 4250 Hz variable frequency sine wave
Frequency Modulation:	1–15 Hz 80–150 Hz 1–150 Hz xx–xx Hz, *xx=any value from 1 to 250 Hz*
Phase Duration:	125 μs
Available Amplitude Modulation Options:	Vector rotation
Available Channels:	Channel pairs 1 & 2 or 3 &4

Premodulated Mode

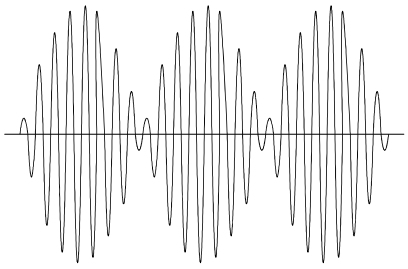

Figure 3.9—Premodulated
Waveform

Waveform Type:	Amplitude modulated sine wave
Polarity:	None
Volts:	0–50 volts RMS, 1 Kohm load
Current:	0–50 mA RMS, 1 Kohm load
Average current at maximum intensity and frequency:	50 mA RMS
Maximum current density under 2" diameter electrode:	2.5 mA/cm²
Frequency:	4,000 Hz
Frequency Modulation:	1–15 Hz 80–150 Hz 1–150 Hz xx–xx Hz, *xx=any value from 1 to 250 Hz*
Phase Duration:	125 μs internal sine wave

	4–1,000 ms beat envelope
Available Amplitude Modulation Options:	Continuous Surge Reciprocation
Available Channels:	All

Medium Frequency Mode

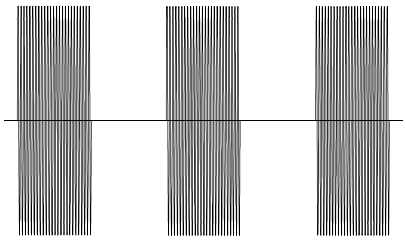

Figure 3.10—Medium Frequency (*Russian*) Waveform

Waveform Type:	Burst modulated sine wave
Polarity:	None
Volts:	0–50 volts RMS, 1 Kohm load
Current:	0–50 mA RMS, 1 Kohm load
Average current at maximum intensity and frequency:	50 mA RMS
Maximum current density under 2" diameter electrode.	2.5 mA/cm²
Frequency:	2500 Hz, Burst at 10 ms on and 10 ms off
Frequency Modulation:	No
Phase Duration:	200 μs
Available Amplitude Modulation Options:	Continuous Surge Reciprocation
Available Channels:	All

Biphasic *(TNS)* Mode

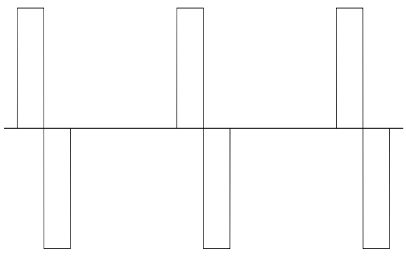

Figure 3.11—Biphasic *(TNS)* Waveform

Waveform Type:	Symmetrical biphasic square wave
Polarity:	None
Volts:	99 volts peak, 1 Kohm load
Current:	0 –99 mA peak, 1 Kohm load
Average current at maximum intensity and frequency:	7.2 mA
Maximum current density under 2" diameter electrode.	0.36 mA/cm²
Frequency:	1–120 HzzHz
Frequency Modulation:	No

Phase Duration:	50–300 µs
Available Amplitude Modulation Options:	Continuous Surge Reciprocation
Available Channels:	All

High Volt Mode

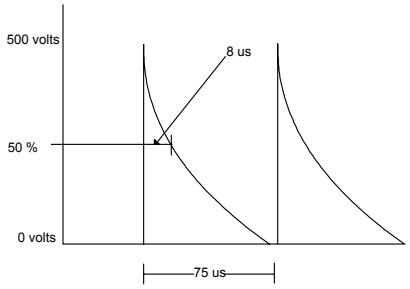

Figure 3.12—High Volt Waveform

Waveform Type:	Monophasic twin peak
Polarity:	Positive or negative
Volts:	500 volts peak, 1 Kohm load
Current:	0–500 mA peak, 1 Kohm load
Average current at maximum intensity and frequency:	1.2 mA at 120 pps with 1 Kohm load
Maximum current density under 2" diameter electrode.	0.06 mA/cm²
Frequency:	1–120 HzzHz
Frequency Modulation:	No
Phase Duration:	8 µs at 50% Vmax
Polarity:	Positive or negative
Available Amplitude Modulation Options:	Continuous Surge
Available Channels:	Channel One only

Microcurrent Mode

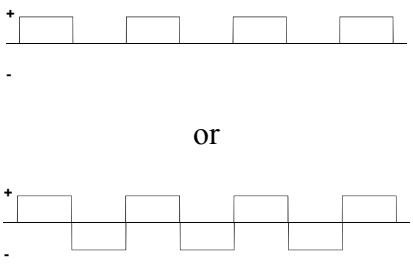

Figure 3.13—Microcurrent Waveform

Waveform Type:	Monophasic or biphasic square wave
Polarity:	Positive or negative or biphasic pulses
Volts:	1 Volt peak, 1 Kohm load
Current:	10-990 µA peak, 1 Kohm load
Average current at maximum intensity and frequency:	990 µA
Maximum current density under 2" diameter electrode.	24.4 µA/cm²
Frequency:	0.5-500 Hz
Duty Cycle:	50%zHz
Frequency Modulation:	No
Pulse Duration:	1-1000 ms

Available Amplitude Modulation Options:	Continuous
Available Channels:	Channel Two only

Amplitude Modulation Specifications:

Vector rotation:	*Interferential Mode Only*
	-50% amplitude modulation in anti phase with an eight second modulation period.

Surge Mode:	*Premodulated, Medium Frequency and Biphasic (TNS) Pulsed Modes*
Up ramp:	3 seconds
Down ramp:	2 seconds
Preset on/off times:	10 seconds on, 10 seconds off 10 seconds on, 20 seconds off 10 seconds on, 30 seconds off 10 seconds on, 40 seconds off 10 seconds on, 50 seconds off 10 seconds on, 60 seconds off
Programmable On time:	1–240 seconds
Programmable Off time:	1–240 seconds

Reciprocation mode:	*Premodulated, Medium Frequency and Biphasic (TNS) Pulsed Modes*
Up and down ramps:	1 second, *reciprocation only*
Reciprocation time:	2–240 seconds, (On time = off time)
Combine with Surge:	Use up and down ramps of surge program Use on/off times of surge program.
Two timer option:	No