

# MS324A\*

## *Low Volt AC Stimulator*



## User's Guide

**Amrex**<sup>®</sup>  
*electrotherapy equipment*  
*a division of Amrex-Zetron, Inc.*

\*Federal law (USA) restricts this device to sale by or on the order of a licensed practitioner licensed by the law of the state in which he practices to use or order the use of this device.

MS324A User's Guide  
*Low Volt AC Stimulator*

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Flextrode®

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## *Thank you. . .*

for selecting the Amrex MS324A Low Volt AC Stimulator. We believe that you will find this instrument to be versatile, dependable and user friendly. The MS324A is designed for the application of low volt ac muscle stimulation. The Amrex MS324A Low Volt AC Stimulator is a dual channel, four pad, low voltage electrical muscle stimulator that produces pulsation, tetanize, surge and reciprocal output. The electrical muscle stimulation may be applied separately or may be combined with ultrasound simultaneously through the ultrasound transducer using an external Amrex SynchroSonic U/50.

Your MS324A has been manufactured by a group of dedicated, highly trained employees who exemplify the sixty year Amrex tradition of manufacturing therapeutic equipment of the highest quality while supporting you with prompt, courteous customer service.

Upon receipt of your MS324A, verify your accessories against the enclosed check list. Promptly return the postage paid Registration Card to Amrex. Save the original shipping carton and all packing materials.

Please carefully review this User's Guide prior to operating the Amrex MS324A Low Volt AC Stimulator. Should you have questions regarding your new purchase, or need assistance, telephone Amrex Technical Services at (800) 221-9069.

## ***Limited Warranty***

Amrex-Zetron, Inc. (Manufacturer) warrants each instrument it manufactures to be free from defects in material and workmanship under normal use and service for a period of two (2) years from the date of purchase. This two year warranty extends only to the original purchaser and shall not apply to batteries, fuses, accessories or any instrument which has been subjected to misuse, neglect, accident or abnormal conditions of operation.

The Manufacturer's obligation under this warranty is limited to repairing or replacing, at the Manufacturer's option, any instrument returned to the factory within two (2) years from the date of purchase. If the Manufacturer determines that the product fails to conform to this warranty due to misuse, alteration or abnormal condition of operation, including evidence that nonauthorized personnel have attempted to repair the device, the instrument will be repaired at customers expense. This warranty is exclusive and in lieu of all other warranties, expressed or implied, including but not limited to any other warranty of merchantability or fitness for any particular purpose. Manufacturer shall not be liable for any special, incidental or consequential damages, whether in contract, tort or otherwise.

## ***Service and Shipping Information***

Amrex Technical Services has a representative to assist you should your equipment require service or repair. It is necessary to obtain a Return Merchandise Authorization (RMA) number before returning equipment to the factory for warranty repair. Call our representative toll free (800) 221-9069. Damage, resulting from repairs made outside the factory, is not covered under the warranty.

To maintain original design specifications, your Amrex muscle stimulator must be calibrated and safety tested on an annual basis. Amrex strongly recommends that servicing be referred to the factory. Call toll free (800) 221-9069.

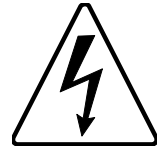
Save the original shipping carton and all packing materials to safely return Amrex equipment to the factory for service; repair; annual calibration, electrical and mechanical safety check. All accessories, including the ac line cord, must be included with the returned instrument. The customer is responsible for all freight charges. The Manufacturer shall assume NO responsibility for damage in transit.

## ***Contraindications—Warnings—Precautions***

THIS INSTRUMENT OPERATES ON 120 VOLTS AC, 60 Hz. (unless otherwise indicated on the unit) AND MUST BE PROPERLY GROUNDED FOR SAFETY. The three wire power cord with "hospital grade" plug should be connected to a GROUNDED AC wall receptacle. It is the personal responsibility and obligation of the user to insure that this instrument is properly connected to the AC POWER source before use.



**Warning**—Risk of burns and fire. DO NOT use near conductive material such as metal bed parts or innerspring mattresses. Renew electrode cables upon evidence of deterioration. Use of controls, adjustment, or performance of procedures, other than those specified herein, may result in hazardous exposure to electrical energy.



### ***Important***

**AMREX Intensity Reset Circuit:** The Amrex Low Volt AC Stimulator incorporates a unique safety reset function as part of the intensity controls. This is to prevent any sudden or inadvertent stimulation output to the patient in the event that:

- The Low Volt AC Intensity controls are not set to the *0/Reset* position enabling the audible "clicks" at power on, provided the power has been off for more than ten seconds.
- The ac power is interrupted for more than ten seconds before power is restored.
- The treatment period has ended and more than ten seconds has elapsed before power on.

The Low Volt AC Intensity controls must be returned to the *0/Reset* position enabling the audible "clicks" before stimulation output can be activated.

**Patient "Treatment Stop" Switch:** When the patient "Treatment Stop" switch is activated, stimulator output will be discontinued immediately. The Reset Intensities indicator light will illuminate. Stimulator output cannot be resumed until the Low Volt AC Intensity controls for Channel A and Channel B are returned to the *0/Reset* position enabling the audible "clicks" which will turn off the Reset Intensities indicator light. NOW the stimulator output can be activated

### *Electrical Muscle Stimulation—Contraindications*

- Contraindicated for patients with cardiac demand pacemakers.
- Should not be used on cancer patients.

### *Electrical Muscle Stimulation—Warnings*

- Long term effects of chronic electrical stimulation are unknown.
- Safety has not been established for the use of electrical muscle stimulation during pregnancy.
- Adequate precautions should be taken in the case of persons with suspected heart problems.
- Adequate precautions should be taken in the case of persons with suspected or diagnosed epilepsy.
- Do not stimulate over the carotid sinus nerves, especially in patients with a known sensitivity to the carotid sinus reflex.
- Severe spasm of the laryngeal and pharyngeal muscles may occur when the electrodes are positioned over the neck or mouth. The contractions may be strong enough to close the airway or cause difficulty in breathing.
- Electrical muscle stimulators should not be applied transcranially.
- Electrical muscle stimulators should not be used over swollen, infected or inflamed areas or skin eruptions.
- Caution should be used in the transthoracic application of electrical muscle stimulators in that the introduction of electrical current into the heart may cause arrhythmias.
- Electrical muscle stimulators should be kept out of the reach of children.

### *Electrical Muscle Stimulation—Precautions*

Precautions should be observed:

- When there is a tendency to hemorrhage following acute trauma or fracture.
- Following recent surgical procedures when muscle contraction may disrupt the healing process.
- Over the menstruating uterus.
- Where sensory nerve damage is present by a loss of normal skin sensation.

Some patients may experience skin irritation or hypersensitivity due to the electrical stimulation or the conductive medium. The irritation can usually be reduced by use of an alternate conductive medium or alternate electrode placement.

Skin irritation and burns beneath the electrodes have been reported with the use of electrical muscle stimulators.

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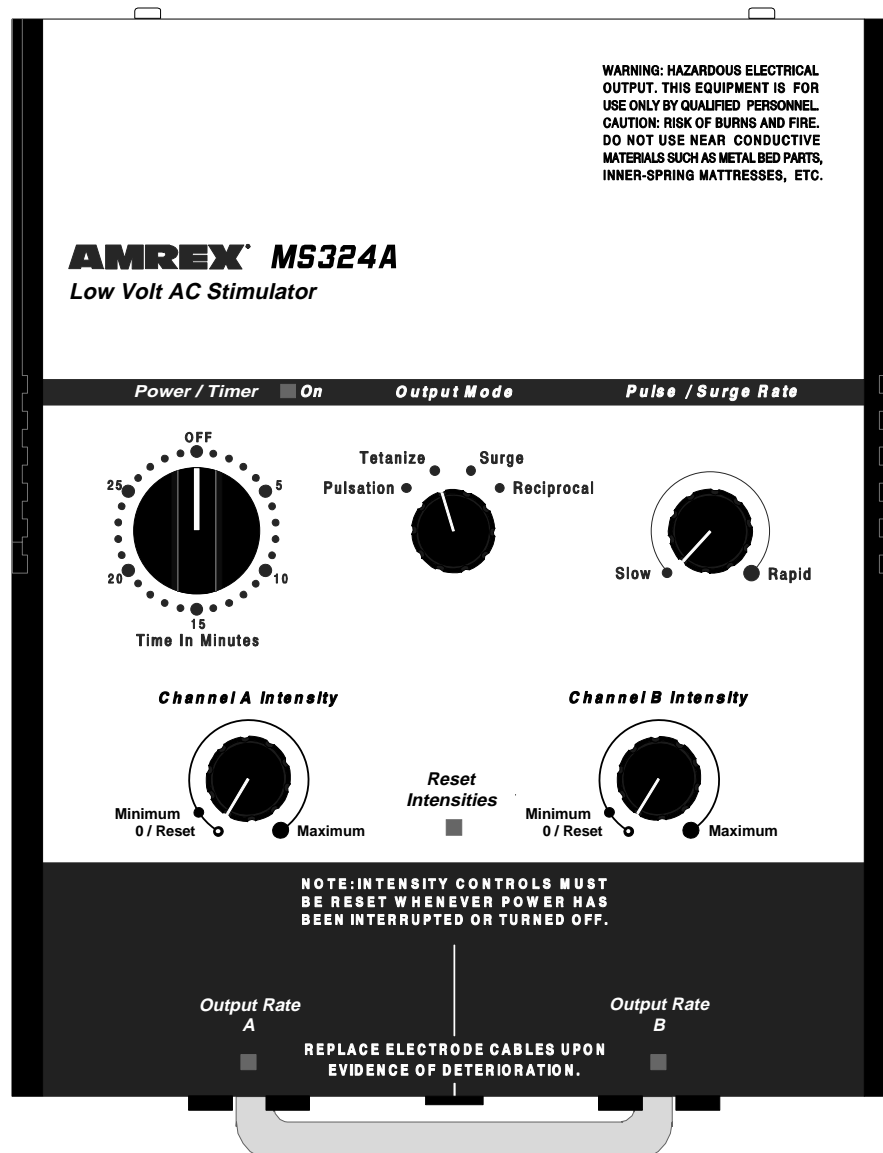
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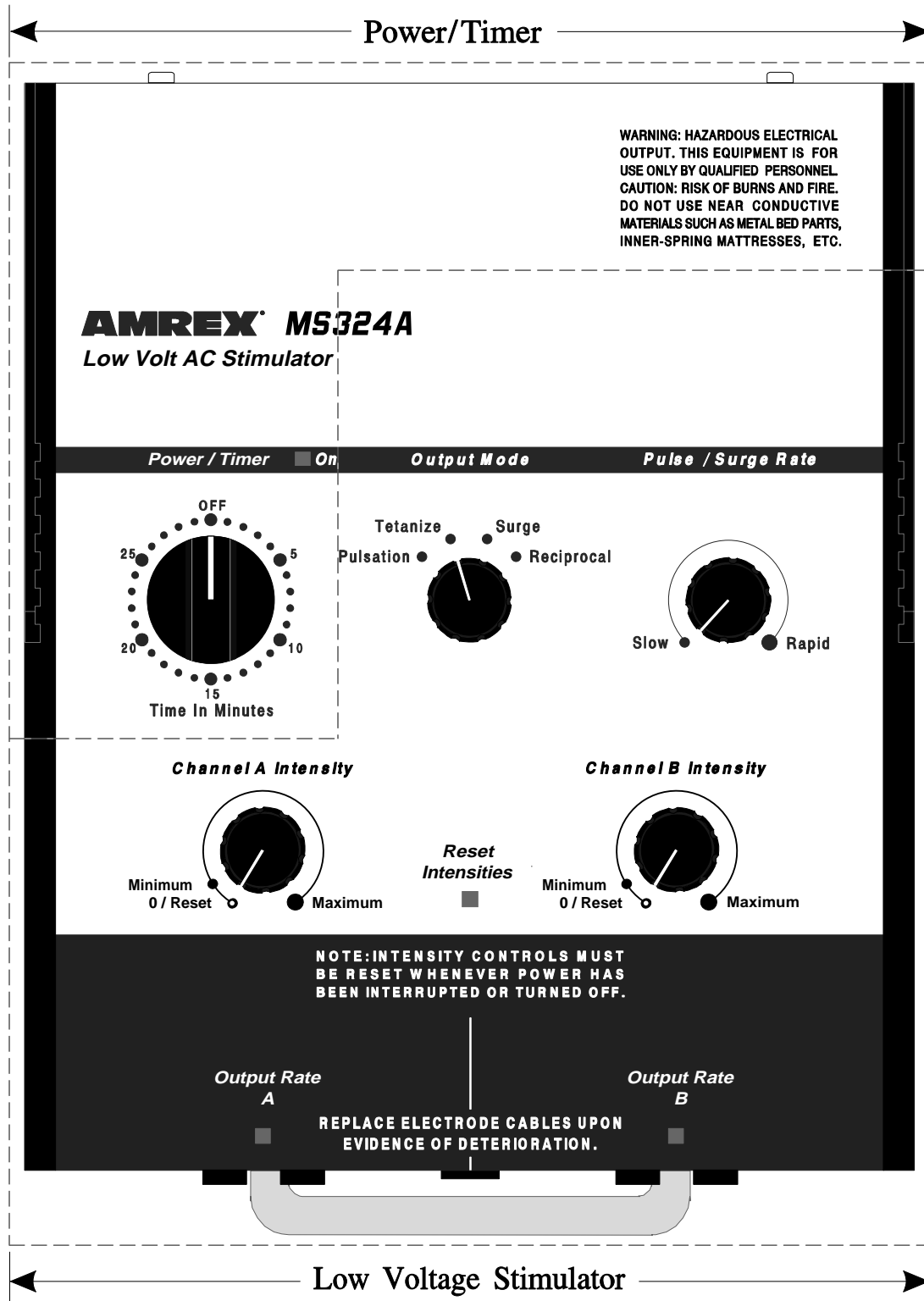


# Overview

The layout of the MS324A panel consists of controls, indicator lights, and output jacks.



In the illustration below, dashed lines surround each of the MS324A's sections. A brief description of each section follows the illustration, and Parts 2 and 3 of this manual contain detailed descriptions.



***Power Section***

Use the Power/Timer to activate the main ac power and set the treatment duration. When the treatment is complete the power will shut off and a bell will sound.

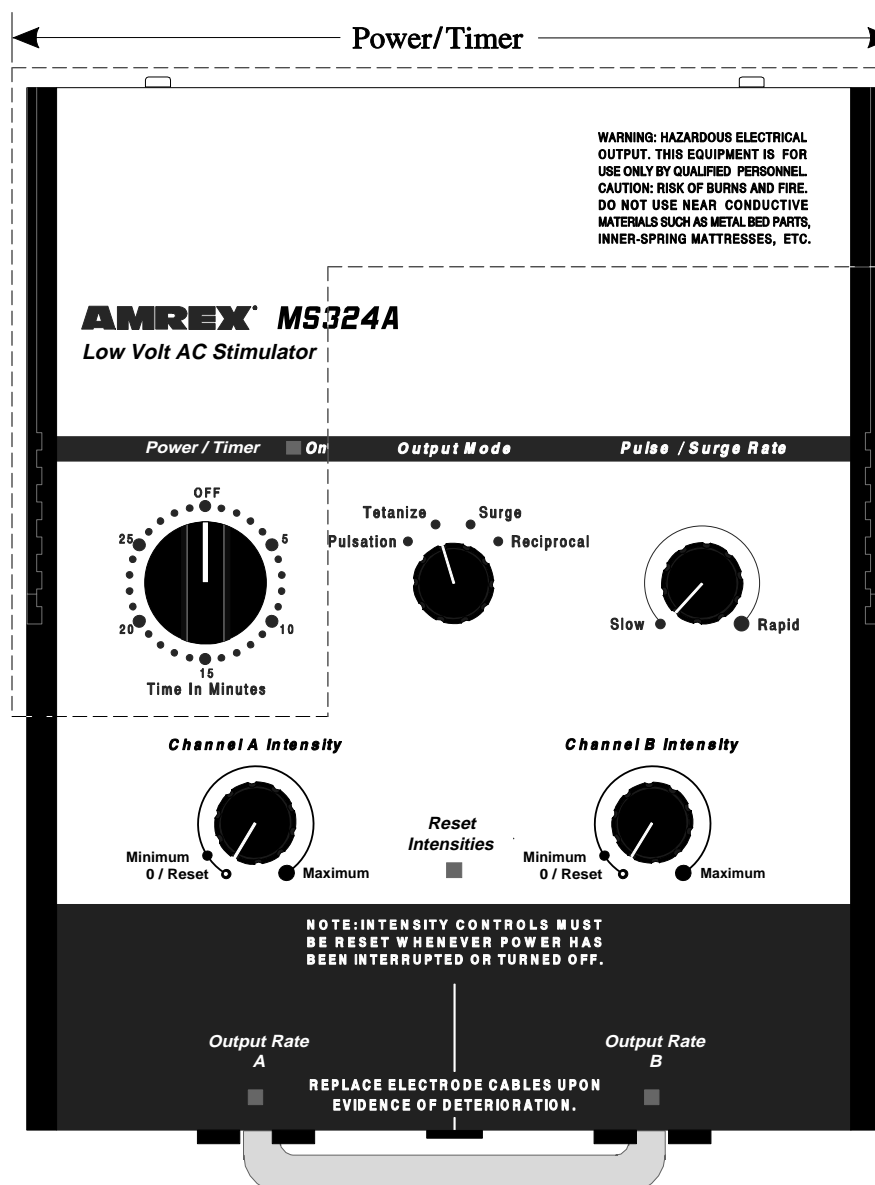
***Low Volt AC Stimulator Modality Section***

Set the intensities and monitor the output of low volt ac stimulation with the controls and connectors in this section of the panel. Select either pulsation, tetanize, surge or reciprocal output using the Output Mode control. Regulate the frequency of the pulses, or adjust the duration of the surge or reciprocal, with the Pulse/Surge Rate control.

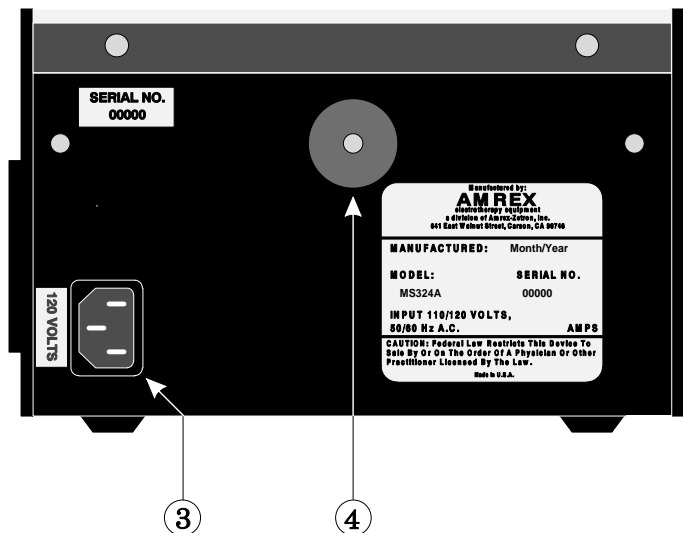
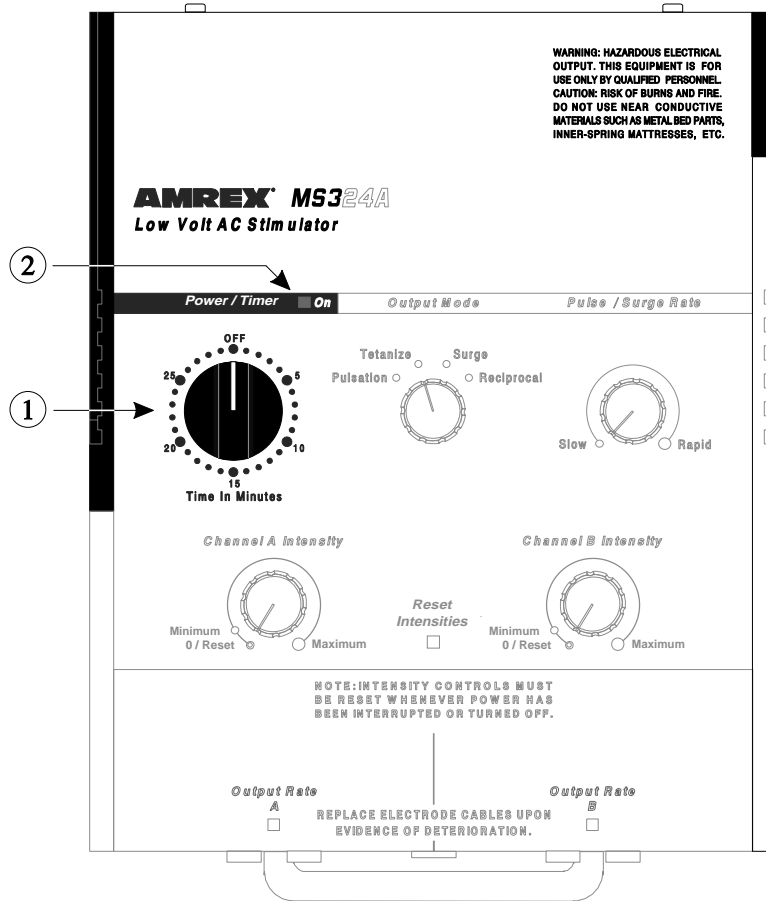


## Power Section

In the illustration below, dashed lines surround the MS324A's power section.



The power section of the MS324A panel is depicted below. Items referenced with circled numbers (1 – 4) are explained on the following page.



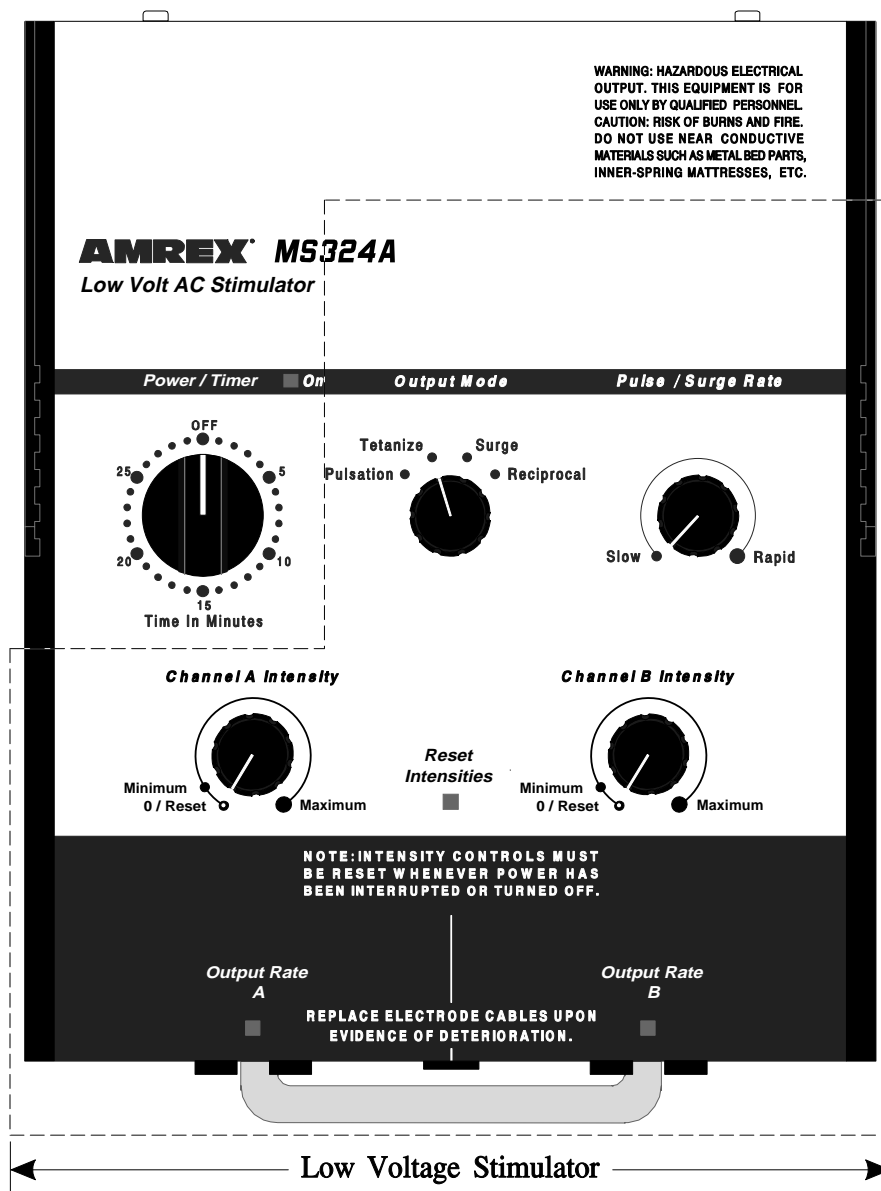
1. **POWER/TIMER:** Controls the main ac power as well as the timer for treatment. Turn the *Power/Timer* knob clockwise past the 10 minute mark and then set it to the desired treatment time. The *On* indicator light (located above the upper right corner of the Power/Timer) will illuminate. The ac power will shut off and a bell will sound when treatment is completed. To initiate early shut off, turn the *Power/Timer* knob counterclockwise to the Off position. The ac power will shut off and a bell will sound.
2. **ON INDICATOR LIGHT:** Will illuminate when the Power/Timer is activated.
3. **AC RECEPTACLE:** Connection for MS324A's ac power cord.
4. **VELCRO WASHER:** To attach wall mount velcro bracket strap.



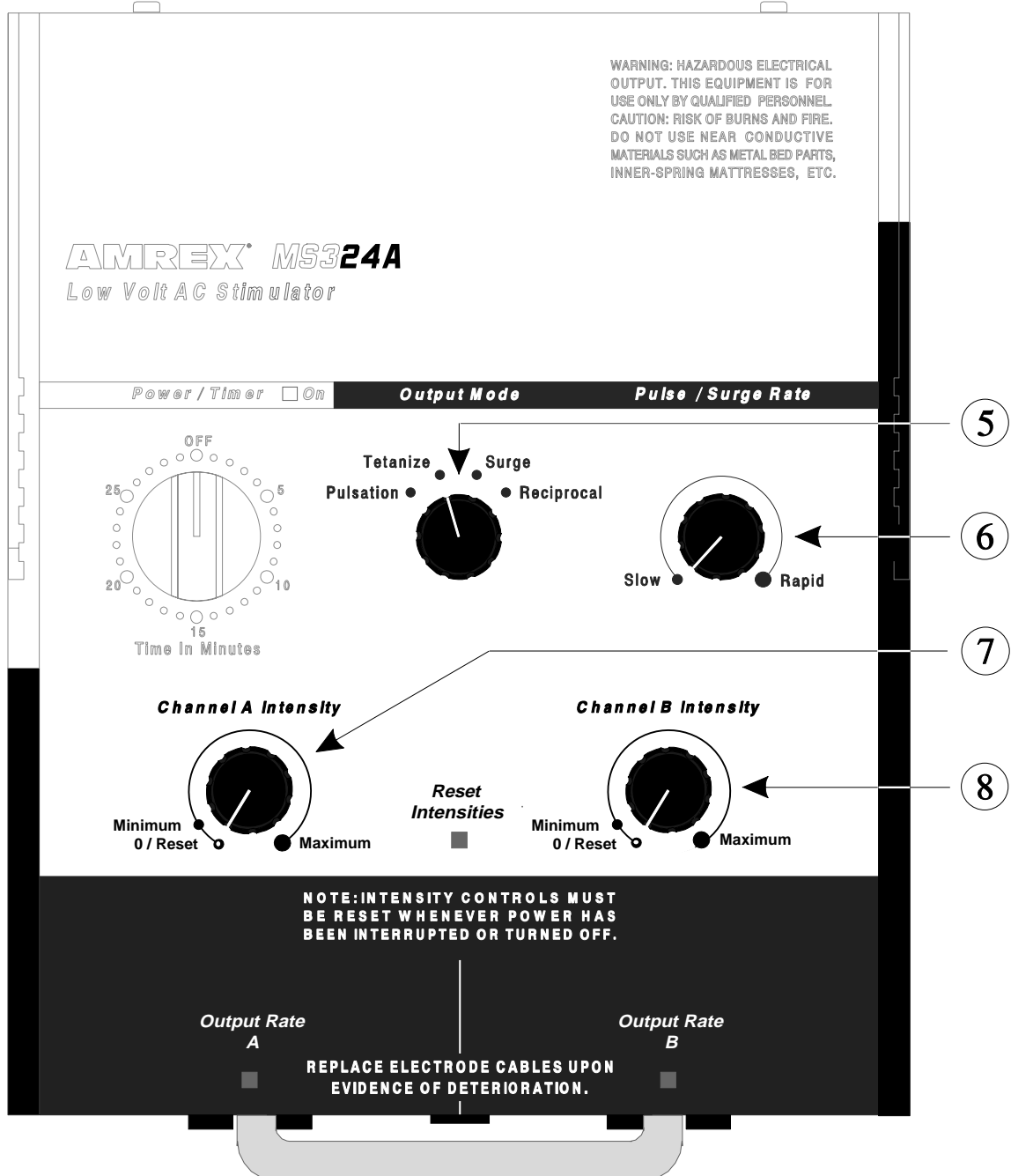


## ***Low Volt AC Stimulator Modality***

In the illustration below, dashed lines surround the MS324A's low volt ac stimulator section.



The low volt ac stimulator section of the MS324A panel is depicted below. Items referenced with circled numbers (5 – 8) are explained on the following page.



**5. LOW VOLT AC OUTPUT MODE CONTROL: (SELECTIONS):**

- *Pulsation* – Pulsed output (variable from 1 to 80 pulses per second)
- *Tetanzize* – Continuous output (set at 80 pulses per second)
- *Surge* – Surged output simultaneously on *Channel A* and *Channel B* (set at 80 pulses per second, surge rate duration variable from 3.75 seconds on, 3.75 seconds off to 0.375 second on, 0.375 second off)
- *Reciprocal* – Reciprocal output alternates between *Channel A* and *Channel B* (set at 80 pulses per second, reciprocal rate duration variable from 3.75 seconds on, 3.75 seconds off to 0.375 second on, 0.375 second off)

**6. PULSE / SURGE RATE CONTROL:**

- Pulsation Mode – Regulates the pulsation rate from *Slow* (1 pulse per second) to *Rapid* (maximum of 80 pulses per second)
- Surge Mode – Regulates the surge rate of *Channel A* and *Channel B* from *Slow* (3.75 seconds on, 3.75 seconds off) to *Rapid* (0.375 second on, 0.375 second off)
- Reciprocal Mode – Regulates the reciprocal rate of *Channel A* and *Channel B* from *Slow* (3.75 seconds on, 3.75 seconds off) to *Rapid* (0.375 second on, 0.375 second off)

**Note:** The Pulse / Surge Rate control has no effect in the Tetanzize Mode.

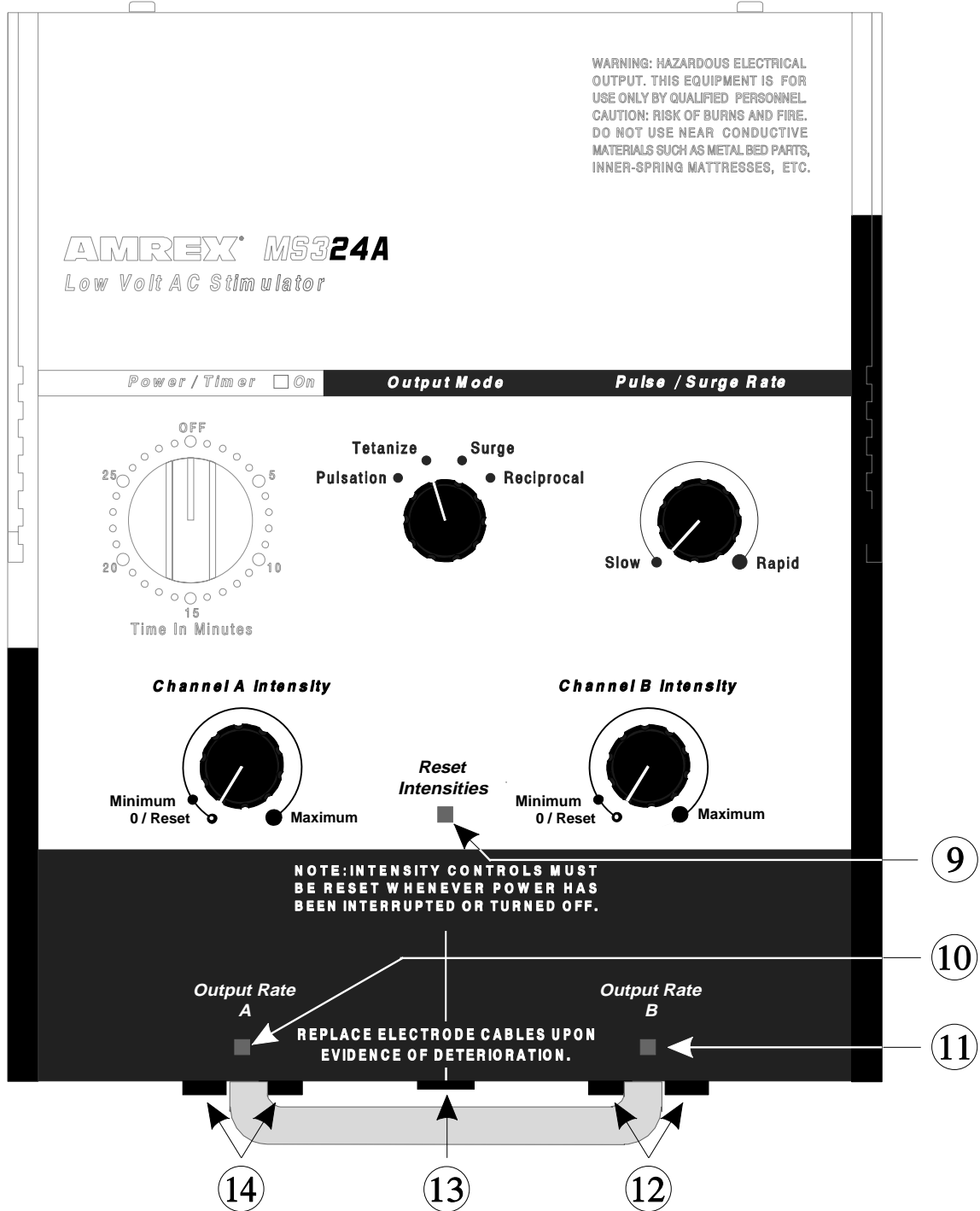
**7. LOW VOLT AC CHANNEL A INTENSITY CONTROL:** Regulates the stimulator output for *Channel A* from 0 to Maximum.

**Note:** The Low Volt Intensity control for *Channel A* has a unique reset circuit feature which prevents the practitioner from applying one patient's treatment settings to another patient. The AMREX Reset Circuit also allows the continuation or extension of the patient's treatment period if power is restored within ten (10) seconds.

**8. LOW VOLT AC CHANNEL B INTENSITY CONTROL:** Regulates the stimulator output for *Channel B* from 0 to Maximum.

**Note:** The Low Volt Intensity control for *Channel B* has a unique reset circuit feature which prevents the practitioner from applying one patient's treatment settings to another patient. The AMREX Reset Circuit also allows the continuation or extension of the patient's treatment period if power is restored within ten (10) seconds.

The low volt ac stimulator section of the MS324A panel is depicted below. Items referenced with circled numbers (9 – 14) are explained on the following page.



- 9. LOW VOLT AC RESET INTENSITIES INDICATOR LIGHT:** When power is restored **more than ten seconds** after being interrupted or turned off, or **more than ten seconds** after the treatment period has been completed and the bell has sounded, the Low Volt AC Reset Intensities indicator light will illuminate. The Intensity controls for *Channel A* and *Channel B* must be returned to the 0/Reset position enabling the audible "clicks" which will turn off the Reset Intensities indicator light. NOW the stimulator output can be activated.

When power is restored **within ten (10) seconds** after being interrupted or turned off, or **within ten (10) seconds** after the treatment period has been completed and the bell has sounded, the AMREX Reset circuit will be bypassed and the Reset Intensities indicator light will not illuminate. This will allow the continuation or extension of the patient's treatment period.

- 10. OUTPUT RATE A INDICATOR LIGHT:** Reflects the output rate for Pulsation, Tetanize, Surge or Reciprocal Mode of *Channel A*.
- 11. OUTPUT RATE B INDICATOR LIGHT:** Reflects the output rate for Pulsation, Tetanize, Surge or Reciprocal Mode of *Channel B*.

**12. LOW VOLT AC STIMULATOR CHANNEL B OUTPUT JACKS**

- 13. "TREATMENT STOP" JACK:** Provides for connection to patient "Treatment Stop" switch.

**Note:** When the patient "Treatment Stop" switch is activated, stimulator output will be discontinued immediately. The *Reset Intensities* indicator light will illuminate. Stimulator output cannot be resumed until the *Intensity* controls for *Channel A* and *Channel B* are returned to the 0/Reset position enabling the audible "clicks" which will turn off the *Reset Intensities* indicator light. NOW the stimulator output can be activated.

**14. LOW VOLT AC STIMULATOR CHANNEL A OUTPUT JACKS**



# ***MS324A General Operation and Application Procedures***

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## ***General Operation***

1. Connect the MS324A's ac power cord to the MS324A's ac receptacle and plug the "Hospital Grade" connector to a properly grounded 120Vac, 60Hz receptacle.
2. Connect the patient "Treatment Stop" Switch to the "TREATMENT STOP" JACK.
3. Reduce the *Low Volt AC Intensity* controls for *Channel A* and *Channel B* to the *0/Reset* position enabling the audible "clicks".
4. Set the *Low Volt AC Output Mode* control to *Tetanzize*.
5. Set the *Pulse/Surge Rate* control at the *Slow* position.
6. Prepare the pad electrodes and apply them to the patient. They may be held in place by means of retention straps or weight bags. Hand the "Treatment Stop" Switch to the patient and explain its function.
7. Turn the *Power/Timer* knob and set it to the desired treatment time.

**Note:** When the treatment time is less than ten (10) minutes, turn the *Power/Timer* knob clockwise past the ten (10) minute mark and then set it back to the desired time. The *On* indicator light (located above and to the right of the *Power/Timer*) will illuminate.

8. Verify that the *Low Volt AC Intensity* controls for *Channel A* and *Channel B* are set at the *0/Reset* position.

9. Slowly increase the *Low Volt AC Intensity* control(s) for *Channel A* and/or *Channel B* to the desired output levels.

**Note:** If the *Reset Intensities* indicator light is illuminated, no output will be obtained until the *Intensity* controls for *Channel A* and *Channel B* are returned to the *0/Reset* position enabling the audible "clicks".

10. Select an alternate *Output Mode*, *Pulsation*, *Surge* or *Reciprocal*, and adjust the *Pulse/Surge Rate* control if so desired. The *Output Rate* indicator lights will reflect the output rate selected.

11. When treatment is completed, the ac power will shut off and a bell will sound. To continue or extend a patient's treatment time, reset the *Power/Timer* knob within ten (10) seconds of shut off. To initiate early shut off, turn the *Power/Timer* knob counterclockwise to the *Off* position. The ac power will shut off and a bell will sound. Reduce the *Intensity* controls for *Channel A* and *Channel B* to the *0/Reset* position enabling the audible "clicks". Thoroughly clean the pad(s) with warm water and dispose of the used cloth cover(s).



## ***Application of Electrical Muscle Stimulation***

Electrical muscle stimulation, high voltage or low voltage ac, is usually applied through carbon type pad electrodes with disposable cloth covers, or sponge type pad electrodes. The *Flextrode System* has been designed for the application of electrical stimulation with the use of carbon type electrodes.

The *Flextrode* pad electrode must be used with the *Flextrode* disposable cloth cover. The cloth cover provides added hygienic protection and increased conductance to the patient. To obtain maximum conductivity, it is important to properly prepare the *Flextrode* pad electrode and cloth cover before application of electrical muscle stimulation.

The *Flextrode* pad electrode and cloth cover assembly must be completely and thoroughly moistened by immersing it in water. Apply a generous amount of Flextrode Conductive Spray to the moistened cloth cover. If the Flextrode Conductive Spray is not desired, apply a generous amount of Amrex Conductance and Coupling Gel to the thoroughly moistened *Flextrode* cloth cover. A generous amount of Flextrode Conductive Spray or Amrex Conductance and Coupling Gel is required to insure good conductivity. Thoroughly clean pad(s) with warm water after each treatment and dispose of the used cloth cover(s).

### **Important**

It is the personal responsibility and obligation of the user to verify that patient cords and electrode pads show no evidence of deterioration prior to patient application. When such evidence exists, replace the cords or electrodes. Never sharply bend or twist the cords. Loose connections or broken cords can cause poor conductance and possible discomfort to the patient.

Should the patient complain of low stimulation output, no output or sudden irregular increases in output, immediately discontinue treatment. Check for the following: secure cord connections; proper electrode contact with the patient; electrode wear or lack of cleanliness. Replace patient cords and/or pad electrodes that show any evidence of deterioration.

### ***Adverse Effects - Shortwave Diathermy Interference***

It is extremely important for the physiotherapist to have a clear understanding of the potential danger involved in the use of a low volt ac stimulator device in close proximity to an active shortwave diathermy unit.

A medical shortwave diathermy unit is a very powerful transmitter of radio energy, the larger ones having an output of 500 watts. Any low volt ac stimulator device with external leads, in close proximity to a shortwave unit, is likely to be affected by interference. This interference may be in the form of sparking between electrodes or between the leads and the device casing. The leads connecting the low volt ac stimulator device to the patient can act as an aerial and collect the radio frequency energy from the shortwave unit. This could interfere with the operation of the low volt ac stimulator unit or affect internal functions of the device. Or, it could result in the patient experiencing some unusual "surges" of current. There is no significant electrical radiation from a low volt ac stimulator device.

The increasing electronic sophistication of physiotherapeutic equipment is likely to mean that this problem is going to become more obvious. The minimum safe operating distance is difficult to determine since local factors must be considered. At least two or three meters is needed between the nearest parts of either instrument, including the cables and electrodes. The low volt ac stimulator device does not need to be plugged into a power supply to be affected by interference from a shortwave unit. Some very old types of shortwave generators seem to produce more interference than others which compounds the problem even further. With some shortwave units, the distance between devices of at least three meters may still be inadequate.

In practice, shortwave diathermy units and low volt ac stimulator units should be placed and operated as far away from each other as possible. It may be necessary to screen off all shortwave units from other equipment or to have fully screened rooms in which shortwave diathermy equipment can be operated without risk of interfering with other sensitive equipment. This is often difficult in a small practice where space is at a premium. In such cases, the units may have to be operated at different times, not simultaneously. In all cases, it would be very dangerous to give shortwave diathermy and low volt ac stimulator treatment to a patient simultaneously.

Any patient who reports a sudden, unexplainable "surge" in output may be experiencing the effects of shortwave interference.

### ***Electrical Muscle Stimulation—Indications***

- Relaxation of muscle spasms
- Prevention or retardation of disuse atrophy
- Increased local blood circulation
- Muscle reeducation
- Maintenance of or increase in range of motion
- Immediate postsurgical stimulation of calf muscles to prevent venous thrombosis

Electrical Muscle Stimulators should only be used under medical supervision for adjunctive therapy for the treatment of medical diseases and conditions.

### ***Electrical Muscle Stimulation—Contraindications***

- Contraindicated for patients with cardiac demand pacemakers.
- Should not be used on cancer patients.

### ***Electrical Muscle Stimulation—Warnings***

- Long term effects of chronic electrical stimulation are unknown.
- Safety has not been established for the use of electrical muscle stimulation during pregnancy.
- Adequate precautions should be taken in the case of persons with suspected heart problems.
- Adequate precautions should be taken in the case of persons with suspected or diagnosed epilepsy.
- Do not stimulate over the carotid sinus nerves, especially in patients with a known sensitivity to the carotid sinus reflex.
- Severe spasm of the laryngeal and pharyngeal muscles may occur when the electrodes are positioned over the neck or mouth. The contractions may be strong enough to close the airway or cause difficulty in breathing.
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- Caution should be used in the transthoracic application of electrical muscle stimulators in that the introduction of electrical current into the heart may cause arrhythmias.
- Electrical muscle stimulators should be kept out of the reach of children.

### ***Electrical Muscle Stimulation—Precautions***

Precautions should be observed:

- When there is a tendency to hemorrhage following acute trauma or fracture.
- Following recent surgical procedures when muscle contraction may disrupt the healing process.
- Over the menstruating uterus.
- Where sensory nerve damage is present by a loss of normal skin sensation.

Some patients may experience skin irritation or hypersensitivity due to the electrical stimulation or the conductive medium. The irritation can usually be reduced by use of an alternate conductive medium or alternate electrode placement.

Skin irritation and burns beneath the electrodes have been reported with the use of electrical muscle stimulators.

# Specifications

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## **Input Power Requirements**

Line Voltage ..... 120 Vac, 60 Hz  
 (Special voltages available on request)

Current ..... 0.25 A

Line Leakage ..... < 50  $\mu$ A

## **Instrument**

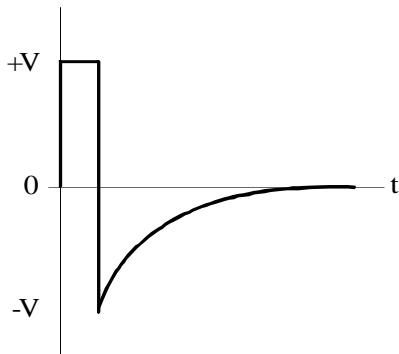
Overall Dimensions ..... 8½" W x 11" D  
 x 5¾" H

Weight ..... 4.5 Lbs

Shipping Weight ..... 11 Lbs

## **Electrical Stimulator**

Waveform ..... asymmetrical alternating  
 current (no load)



Output Voltage ... 110 V peak into 1K ohm load  
 28 V peak into 100 ohm load

Output Intensity ..... 56  $\mu$ C  
 maximum charge per pulse  
 into 100 ohm load

Pulse Width ..... 200  $\mu$ s  
 at 50% V maximum

## **Frequency**

Pulsation Mode ..... 1 to 80 pps

Tetanize Mode ..... 80 pps

Surge Mode ..... 80 pps

Reciprocal Mode ..... 80 pps

Surge Duration (seconds) ..... variable  
 from 3.75 on/off to 0.375 on/off

Reciprocal Duration (seconds) ..... variable  
 from 3.75 on/off to 0.375 on/off

## **Cleaning Instructions**

1. Disconnect the power supply.
2. Use mild soap with a lightly moistened cloth.
3. Air dry before using.

### ***Service and Shipping Information***

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