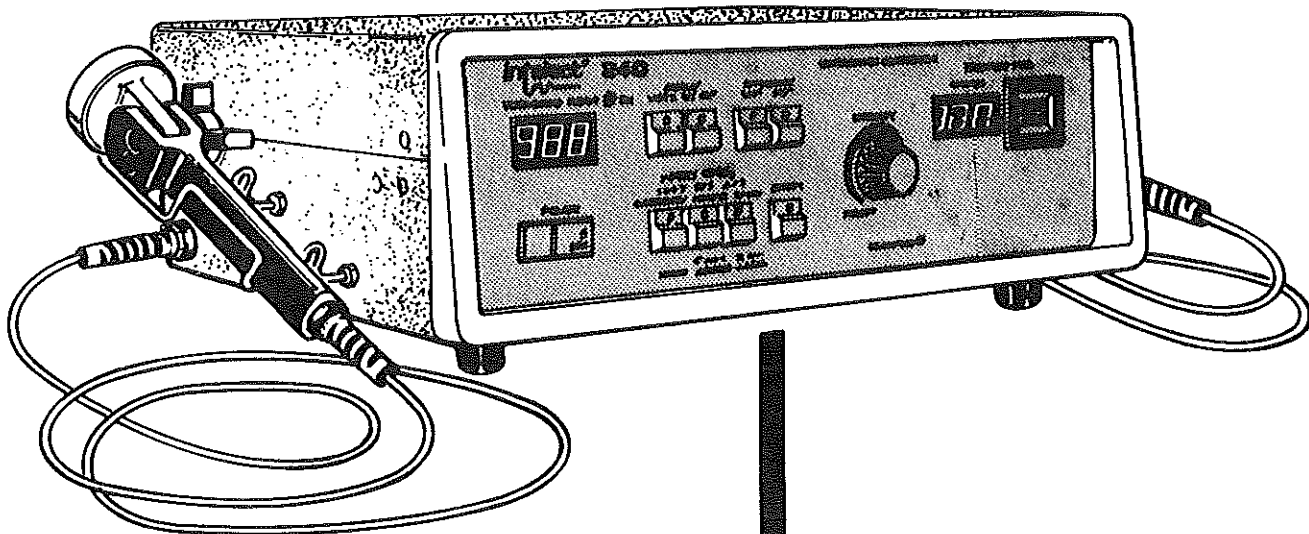


intelect[®]

MODEL 240/250 ULTRASOUND



OPERATOR'S MANUAL

- INSTALLATION
- OPERATION
- MAINTENANCE
- PARTS

**CHATTANOOGA
CORPORATION**

101 MEMORIAL DR./P.O. BOX 4287 CHATTANOOGA, TN 37405-0287

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foreword

This manual has been prepared for the owners and operators of Intellect® Model 240/250. It contains general instructions on operation, safety practices, maintenance and parts information. In order to obtain maximum life and efficiency from your Model 240/250 and to aid in the safe operation of the unit, read and understand this manual thoroughly and become totally familiar with the controls on the panel and the various electrodes that come with the unit before operating it. The specifications put forth in this manual were in effect at the time of publication. However, due to Chattanooga Corporation's policy of continuous improvement, changes to these specifications may be made at any time without obligation on the part of Chattanooga Corporation.

full one year warranty

Chattanooga Corporation ("Company") warrants that Intellect® Model 240/250 ("Product") is free of defects in material and workmanship.

This warranty shall remain in effect for one (1) year from the date of the original consumer purchase of this Product and extends to any owner of the Product during the warranty period. If this Product fails to function during the one year warranty period because of a defect in material and workmanship, Company or the selling dealer will replace or repair the Product without charge within a period of 30 days from the date on which the defective product is returned to the Company or the dealer. Company or the dealer will ship the replacement of the repaired product to the consumer's residence.

THIS WARRANTY DOES NOT COVER:

1. Replacement parts or labor furnished by anyone other than Company, the dealer or an approved Company service agent.
2. Defects or damage caused by labor furnished by someone other than Company, the dealer or an approved Company service agent.
3. Any malfunction or failure in the Product while it is in the possession of the owner during the warranty period if the malfunction or failure is not caused by a defect in material and workmanship or if the malfunction or failure is caused by the unreasonable use, including the failure to provide reasonable and necessary maintenance.

COMPANY SHALL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES TO PROPERTY OR BUSINESS. Some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you.

TO OBTAIN SERVICE from Company or the selling dealer under this warranty, the owner must do or abide by the following:

1. A written claim must be made within the warranty period to Company or the selling dealer. If the claim is made to Company, the written claim should be sent to P.O. Box 4287, 101 Memorial Dr., Chattanooga, Tennessee, 37405.
2. The Product must be returned to Company or the selling dealer by the owner.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Company does not authorize any person or representative to create for it any other obligation or liability in connection with the sale of this Product. Any representative or agreement not contained in the warranty shall be void and of no effect.

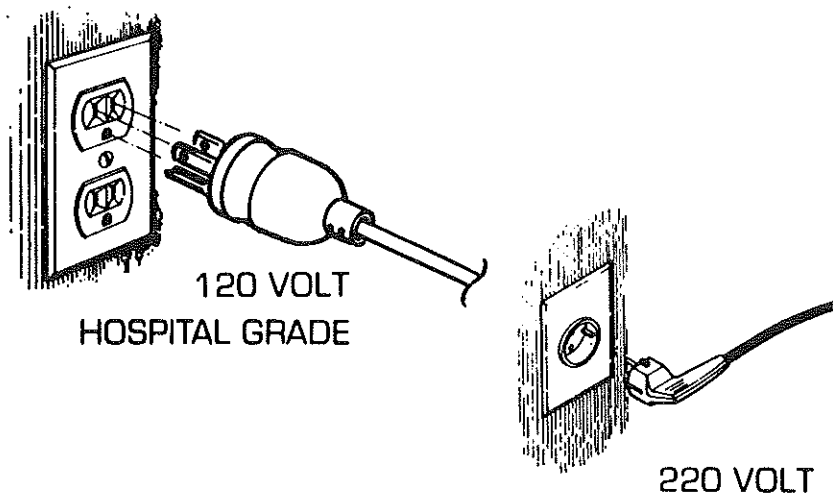
safety instructions

1. **WARNING:** Explosion hazard if used in the presence of flammable anesthetics.
2. **WARNING:** For continued protection against fire hazard replace fuses only with ones of the same type and rating.
3. Read, understand and practice the safety and operating instructions. Know the limitations and hazards associated with the Ultrasound. Observe the safety and operational decals placed on the unit.
4. Know stimulation characteristics, parameters, indications, and contraindications.
5. Grounding—Make certain that the unit is electrically grounded by plugging into an electrical outlet with a ground terminal receptacle (U-ground outlet). Follow the National Electric Code.
6. The Intelect Model 240/250 should not be connected to any other electrical device when in use.
7. **CAUTION:** Federal law restricts this device to sale by, or on the order of, a physician or licensed practitioner.
8. The ultrasound generator should be routinely checked before each use to determine that all controls function normally; especially that the INTENSITY control does properly adjust the intensity of the ultrasonic power output in a stable manner. Also determine that the TREATMENT TIME control does actually terminate ultrasonic output power when the timer reaches zero.
9. **CAUTION:** Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous exposure to ultrasonic energy.

installation

Remove the Intellect® Model 240/250 and any additional items ordered with the unit from the carton and inspect for damage that may have occurred during shipment.

Check the voltage rating on the serial plate located on the back of the unit. Plug the unit into a 120 Volt or 220 Volt A.C. outlet as required. DO NOT attempt to use direct current. Follow the procedures indicated in the safety instructions. DO NOT attempt to use the unit if it is not properly grounded.



specifications

Frequency-1.0 MHz \pm 5%

Duty Cycle- 100% (continuous mode)
50% \pm 10% (pulse mode)
20% \pm 10% (pulse mode)

Pulse Duration- 5 msec \pm 20% (50% duty cycle pulsed mode)
2 msec \pm 20% (20% duty cycle pulsed mode)

Pulse Repetition Rate-100 Hz \pm 20%

Ultrasonic Power- variable from 1 watt to 20 watts, Intellect 250
variable from .4 watt to 10 watts, Intellect 240

Output Meter Accuracy- \pm 20% (for any output above 10% of maximum)

Temporal Peak/Average Intensity Ratio- 2:1, \pm 20% for 50% Duty Cycle.
5:1, \pm 20% for 20% Duty Cycle.

Output:

1. Continuous- 1 MHz signal that is on as long as the timer is running.
2. Pulse-1MHz signal modulated 100% by the 100 Hz rectangular wave with the selected Duty cycle.

Timer Accuracy: \pm 0.2 minute

Applicator:

1. Effective radiating area- 8.5 CM² \pm 1.5 CM², for 10 CM² crystal
4.0 CM² \pm 1.0 CM² for 5 CM² crystal
1.8 CM² \pm .2 CM² for 2 CM² crystal
2. Maximum beam non-uniformity ratio-6.0:1
3. Beam type-collimating

Input power requirements: (Domestic) 120V \pm 10%/60 Hz 3/4 amp
(Export) 220V \pm 10%/50 Hz 3/8 amp

Size- 5'' x 15'' x 11''

Weight- 13 lbs.

indications for ultrasound therapy*

Some indications for the use of ultrasound include adhesive capsulitis, bursitis with slight calcification, myositis, soft tissue injuries, shortened tendons due to past injury, healing scar tissue and plantar warts. Ultrasound is an efficient modality when used for the treatment of all types of joint contractures resulting from capsular tightness and scarring. Ultrasound is the modality of choice to obtain therapeutic levels of heating within body structures covered by thick layers of soft tissue. Neither shortwave or microwave diathermy is able to heat these underlying structures to produce results comparable to ultrasound.

contraindications of ultrasound therapy*

Ultrasound should not be used over the eyes or the reproductive organs.

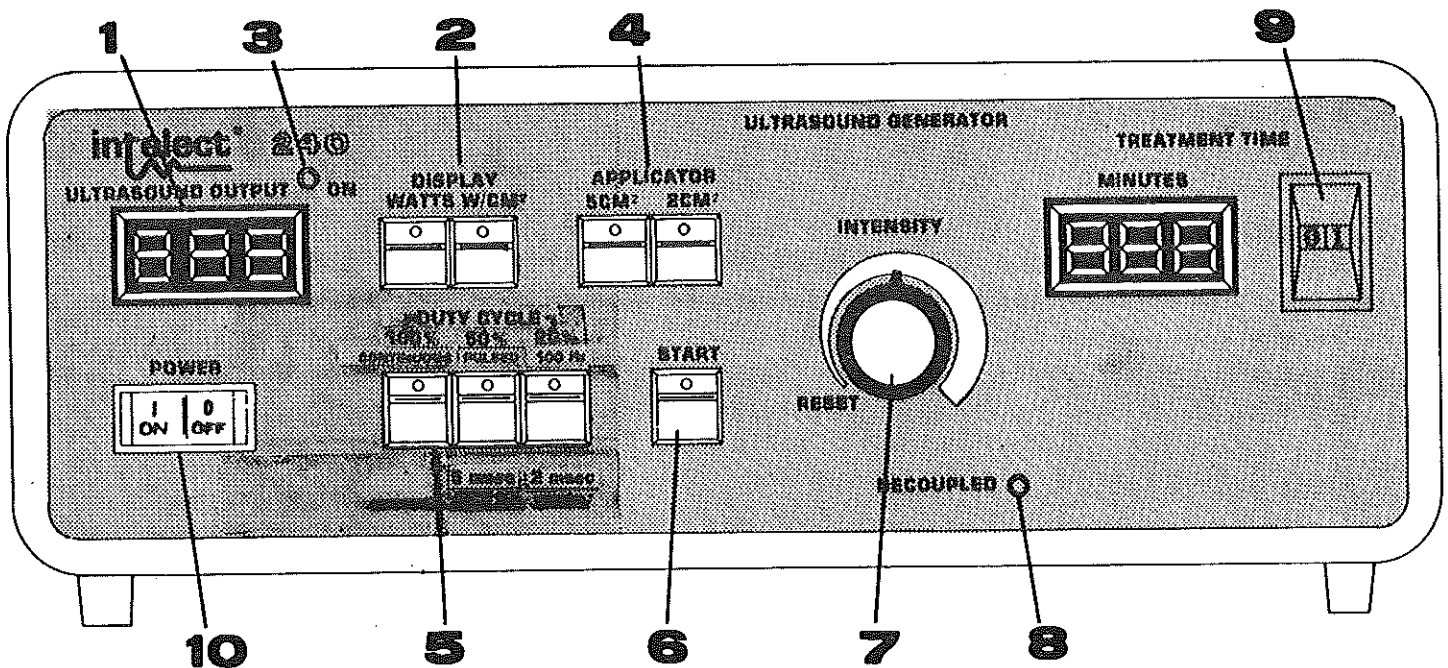
Ultrasound should not be used over a pregnant uterus.

Other contraindications include acute infection or sepsis, deep vein thrombosis, or arterial disease, and over anesthetized areas or conditions that cause impairment of sensations, such as chemotherapy.

Ultrasound is not to be used over cancerous lesions.

*Ref: Lehmann, J.F., Therapeutic Heat and Cold; 13: 367-378; 1972.

240/250 control panel operation



1. **ULTRASOUND OUTPUT DISPLAY:** This display shows the amount of ultrasound power and intensity available at the transducer (sound head). In continuous (100%) mode average power is displayed. In pulsed mode (50%, 20%) peak power is displayed.
2. **OUTPUT SELECT:** These push switches are used to select either ultrasound power in watts or intensity in W/CM². The illuminated LED in each switch will indicate which read-out is selected.
3. **ULTRASOUND INDICATOR LED:** Indicates when ultrasound is being produced by the transducer (sound head).
4. **APPLICATOR SELECT:** Used to select either 10 CM² or 5 CM² applicator on the I-250. (5 CM² or 2 CM² on I-240). Only one is active at anytime.
5. **DUTY CYCLE SELECTOR:**
 - 100% CONTINUOUS SWITCH:** By pressing this switch, the operator can select an ultrasound output that is a continuous sinusoidal waveform at a frequency of 1 MHz nominal.
 - 50% PULSED SWITCH:** By pressing this switch, the operator can select an ultrasound output of 1 MHz that is pulsed at 100 pulses per second. This produces rectangular pulses of 5 milliseconds duration, with an off time of 5 milliseconds between pulses.
 - 20% PULSED SWITCH:** By pressing this switch, the operator can select an ultrasound output of 1 MHz that is pulsed at 100 pulses per second. This produces rectangular pulses of 2 milliseconds duration, with an off time of 8 milliseconds between pulses.
6. **START:** Depressing this switch activates ultrasound treatment.

- 7. INTENSITY/RESET CONTROL:** Rotating this knob clockwise increases the amount of ultrasound power being delivered by the transducer (sound head.) The knob must be returned counter-clockwise to the reset position with any change of function or at initial turn-on of unit.
- 8. DECOUPLED LED:** Indicates if ultrasound has been sufficiently acoustically coupled to the patient. If insufficient coupling occurs, ultrasound power will stop after 9 seconds and the red LED (decoupled) will illuminate, and three tones will sound. If the sound head is recoupled within 25 seconds the treatment time will resume and unit will function normally.
If the unit is decoupled for more than 25 seconds, a continuous tone will sound. It will shut down immediately and must be restarted.
This is a safety feature designed to assure the proper amount of ultrasound treatment is being applied to the patient.
- 9. TREATMENT TIME:** This is a 0-19 minute timer. Treatment time is set on the thumbwheel dial and the display will count down from the set point to 0. A tone will sound when treatment time is over. Timer stops and holds during the time the applicator is decoupled.
- 10. POWER SWITCH:** Rocker switch that applies power to the unit when placed in the ON position. Panel displays light when the switch is on.

operating procedure

1. Plug the unit into a properly grounded outlet of the proper voltage and line frequency. Refer to the Nameplate on the rear of the unit.
2. Operator should adjust the applicator handle to the desired position. Tighten the thumbscrew securely.
3. Set the desired treatment time using the thumbwheel switch. Turn the intensity knob to its minimum or reset position (fully counter-clockwise).
4. Turn unit power switch on. The display's should illuminate.
5. Select the desired applicator size and duty cycle. A default position will be displayed in W/CM², applicator size would be 10 CM², duty cycle 20%.
6. At this point you may begin the treatment by applying Intellect Ultrasound Gel to the area of the patient to be treated.
7. Depress start button and slowly increase intensity to the desired level.
8. Place the applicator in contact with the patient's body with a firm uniform pressure. You must keep the applicator moving during the treatment. Failure to keep the applicator moving may result in hazardous exposure to the ultrasound energy.
9. If you need to interrupt the treatment for any reason, decrease the intensity to the reset position. To resume treatment, repeat steps 4—8.
10. At the end of the treatment, the end of treatment beeper will sound and the ultrasound output will be shut off.

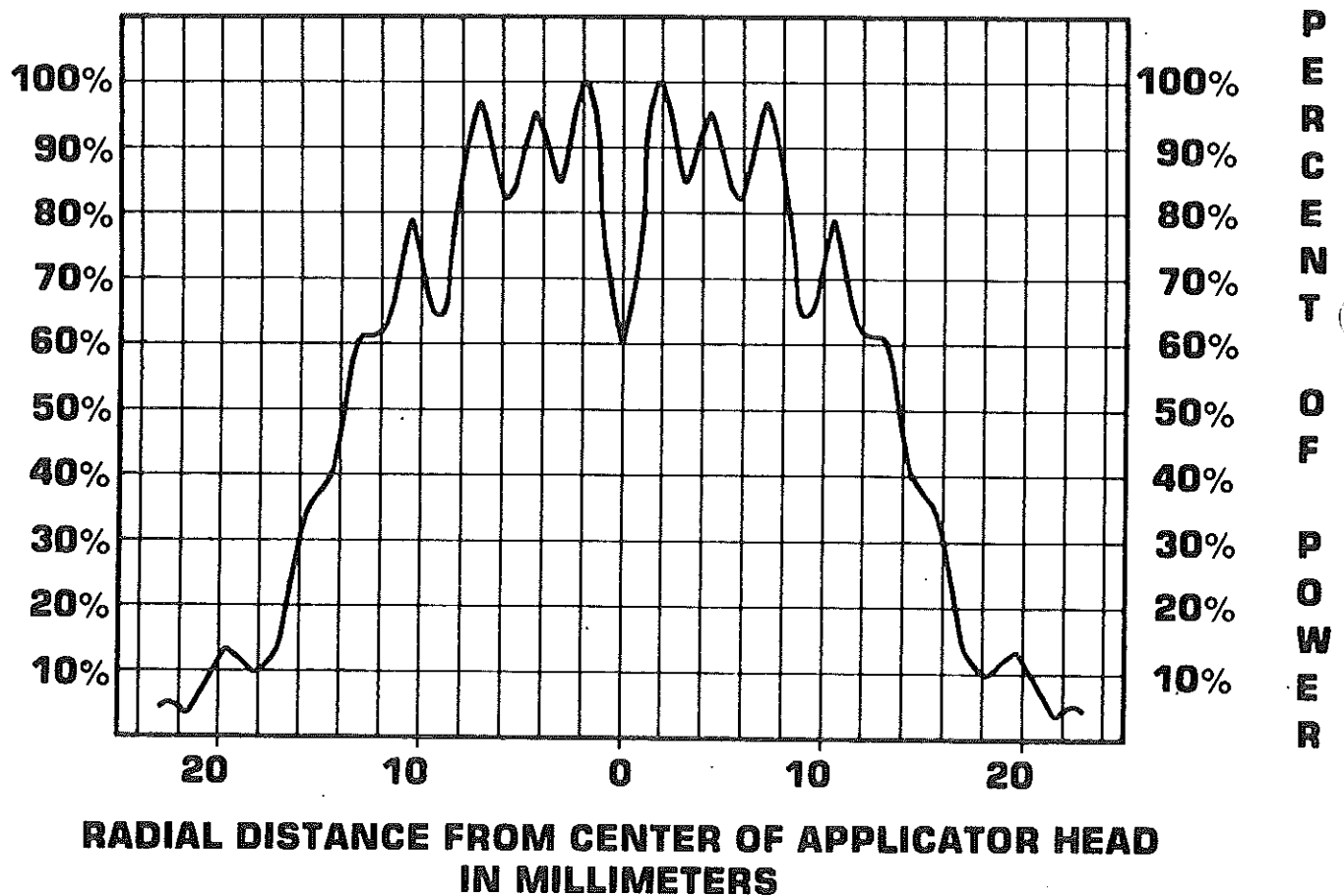
description of ultrasonic field

The spatial distribution of the radiated field is essentially a collimated beam of ultrasonic energy having a cross-sectional area of 8.5 CM² for the 10 CM² sound head when measured at a point 5 millimeters from the transducer face.

The energy distribution within the radiated field is 2.4 W/CM² maximum, and takes a generally conic shape having decreasing intensity at progressively increasing distance from the face of the transducer.

This field distribution applies for the radiation emitted into the equivalent of an infinite medium of distilled degassed water at 30 deg. C. and with line voltage variations in the range of ± 10 percent of the rated line voltage. The ultrasonic field spatial distributions of the 5 CM² sound head and the 2 CM² sound head are essentially the same as the field of the 10 CM² sound head.

PLOT OF ULTRASONIC FIELD SPATIAL DISTRIBUTION 10 CM²



abbreviations

The following abbreviations are used on the applicator heads of the Intellect 240/250.

Area= Effective Radiating Area

Coll.= Collimating

BNR= Beam Non-Uniformity Ratio

Freq.= Frequency

maintenance and service instructions

1. To fully maintain compliance with Federal Regulation Title 21 (21 CFR) this unit must be recalibrated annually. It is recommended that all Chattanooga Corporation Ultrasound Products be returned to the factory or an authorized servicing dealer for repairs or recalibrations. It is also recommended after the replacement or repair of any major component. (See Section for Calibration Procedures.)
2. The following items should be checked at least monthly to insure proper operation of this unit:
 1. Power cord and plug. Check to make sure the cord is not frayed, kinked or has torn or cut insulation.
 2. Transducer (applicator) Cable. Check to make sure the cable is flexible, free of kinks, not frayed and that insulation is intact.
 3. Transducer (applicator) Handle. Check to make sure that it is not cracked or broken.
 4. Transducer (applicator) Face. Check to see that there is no build-up of gel or foreign material on the stainless steel face.
 5. LED's. Check each function to see if the LED is on when you are using that function.

calibration

CAUTION: An Electrical Shock Hazard is present during several portions of the calibration procedure. Calibration should be performed by a Qualified Service Technician.

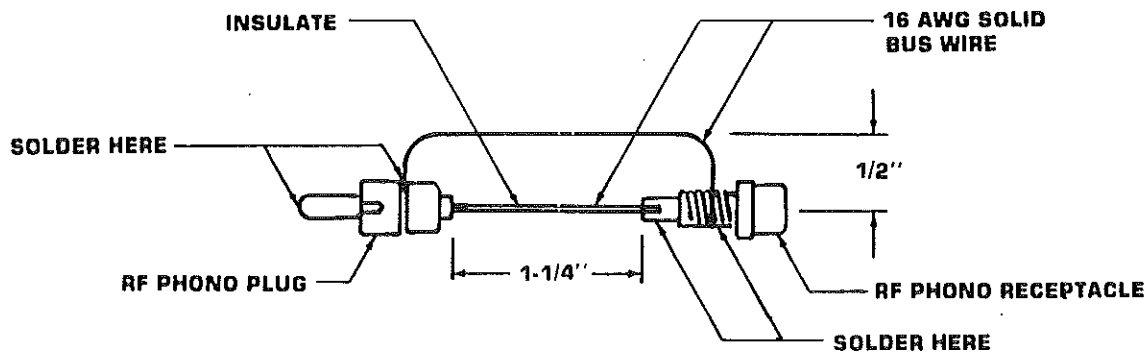
1. TEST EQUIPMENT REQUIRED

- .1 Power line monitor (expanded scale voltmeter for rated line voltage $\pm 10\%$), VIZ model WV-120B or equivalent for 120VAC line.
- .2 Autotransformer, adjustable from 90% to 110% of rated line voltage, 150 watts or greater.
- .3 Ultrasound Power Meter, Ohmic Instructions Model UPM-30 or equivalent.
- .4 Oscilloscope, Hameg Hm 204-2 or equivalent.
- .5 Probe, voltage, X10, Scope, low capacitance.
- .6 Probe, current, Textronix P6021 AC current probe or equivalent.
- .7 Voltmeter, Digital, 3-1/2 digits, Simpson Model 461 or equivalent.
- .8 Source of approximately 1/2 gallon of distilled de-oxygenated (<5 PPM) water at 30 degrees Celsius for use in UPM-30 power meter (item #3).
- .9 Counter, frequency, 10 MHz, Triplet 7000 or equivalent.
- .10 Stopwatch, Siliconix Model 705 or equivalent.
- .11 Applicator current transformer adapter (see Fig. 1).

2. INSTRUMENT PREPARATION

- .1 Remove the top cover of the unit by removing the six #6 truss head screws (three on each side) and lift the cover off the cabinet.
- .2 Remove the two #6 truss head screws on the sides near the bezel (one screw on each side). The Front Panel can now be tilted forward for easy access to the adjustments on the control board and display board.
- .3 Insert a RF current probe adaptor between the ultrasound applicator cable and the RF phono receptacle for the oscillator to be calibrated first* on the shield box located on the rear panel. The adaptor construction is shown in Fig. 1.

* 10 CM² on the I-250 and 5 CM² on the I-240.



- .4 Connect a jumper across Z1 on the control board.

.5 Preset the trimpots on the control board to the following positions:

trimpot	position	trimpot	position
R8	fully clockwise	R73	fully clockwise
R9	fully clockwise	R76	fully clockwise
R45	fully clockwise	R51	mid-range
R46	fully clockwise	R65	mid-range
R47	fully clockwise	R69	mid-range
R48	fully clockwise	R80	fully clockwise
		R81	fully clockwise
		R88	fully clockwise

3. TEST SET-UP

- .1 Connect the test set-up shown in fig. 2.
- .2 Set AC input voltage with the autotransformer to 120 (220) VAC on the line monitor.
- .3 See OHMIC Instruments Operating notes for Model UPM-30 for the operation of the US. power meter.

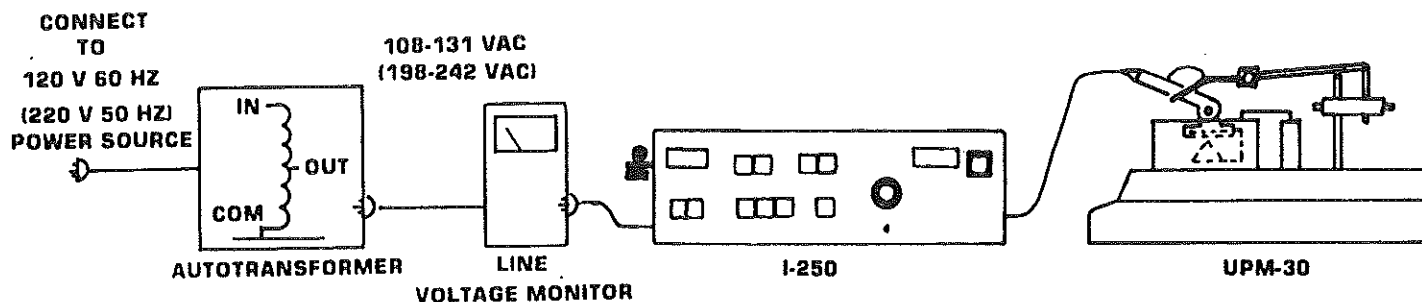


FIGURE 2

4. LOW VOLTAGE POWER SUPPLY CHECK

- .1 Turn on the unit by pressing the POWER switch to ON.
- .2 Measure the voltages (+5V, +12V, and -12V) on the power supply board with COM as reference point. All three voltages should be within 5% of rating.

5. TIMER TEST

- .1 Turn on the unit by pressing the POWER switch to ON.
- .2 Set the TREATMENT TIME thumbwheel switch to each 1 minute increment between 1 and 19 and press the START switch each time to check that the TREATMENT TIME display is loaded with the correct number. NOTE: The POWER switch will have to be turned off and then back on again to reset the display between checks.
- .3 Rotate the INTENSITY control fully counter-clockwise.
- .4 Set the TREATMENT TIME to 19 minutes and press the START switch. Check the accuracy of the timer with the stop watch or a time interval counter.

6. SQUARING CIRCUIT ADJUSTMENT

- .1 Install a jumper between TP8 and the junction between R38 and R43.
- .2 Monitor the d.c. voltage between TP9 and TP8 and adjust R51 for a voltmeter reading of zero ± 0.005 V.
- .3 Move the jumper from TP8 to TP2.

- .4 Monitor the d.c. voltage on TP2 with reference to TP8 and adjust the INTENSITY control on the front panel for a voltage reading of $1.00 \pm .01V$.
- .5 Monitor the d.c. voltage on TP9 with respect to TP8 and adjust R65 for a voltage reading of $.100 \pm .002V$.
- .6 Adjust the INTENSITY control fully clockwise and measure the voltage between TP2 and TP8. This reading should be near +5V.
- .7 Adjust R69 for a voltage reading equal to $\frac{[\text{Voltage (TP2 to TP8)}]^2}{10}$

Example: $\frac{(5.000)^2}{10} = 2.500$

- .8 Repeat steps .1 thru .7 until all three multiplier output voltages are within tolerance.
- .9 Remove the jumper between TP2 and R38/R43.

7. OUTPUT DISPLAY ZERO ADJUSTMENT

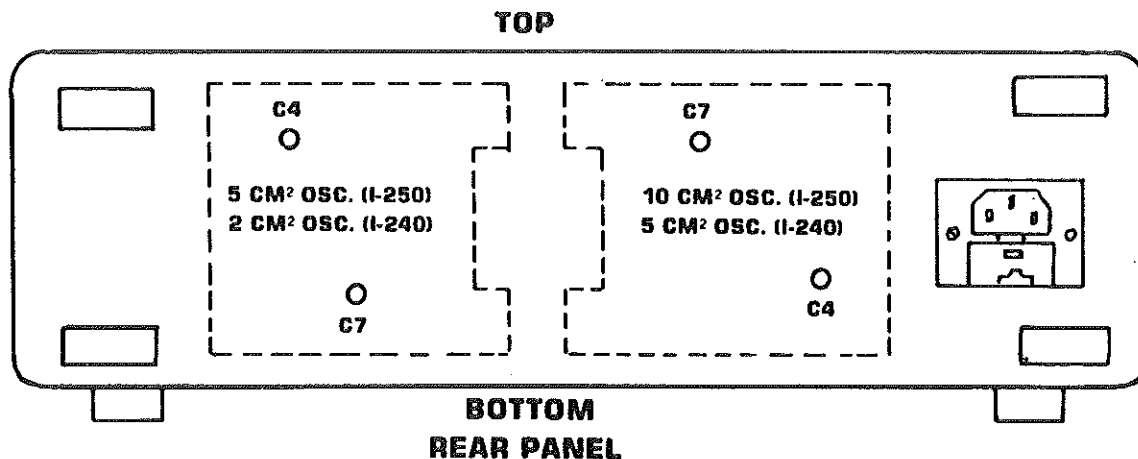
- .1 Connect a jumper from TP6 to TP8.
- .2 Adjust R22 on the display board clockwise until the OUTPUT display starts indicating a value above zero and then adjust R22 counterclockwise until the display just indicates 000.
- .3 Remove the jumper between TP6 and TP8.

8. PULSE FREQUENCY AND DUTY CYCLE ADJUSTMENT

- .1 Select 20% DUTY CYCLE and connect the oscilloscope voltage probe to pin #4 on J1 on the control board and ground clip to TP8.
- .2 Adjust the time base of the oscilloscope to 1 msec/div and measure the period of the 100 Hz signal. It should be between 8.0 msec and 12 msec.
- .3 Adjust the scope time base for 10 divisions of one cycle of the signal. On the control board, adjust R76 for a pulse width of 7.9 divisions.
- .4 Select 50% DUTY CYCLE and adjust R73 on the control board for a pulse width of 4.7 divisions.
- .5 Select 100% DUTY CYCLE and observe that the signal is a DC level less than .5V.

9. 10CM² OSCILLATOR ADJUSTMENT (I-250 only)

- .1 Check that the Intensity control is fully CCW. Then, remove jumper across Z 1.
- .2 Connect the scope current probe around the center conductor of the current probe adaptor and connect the voltage probe between the center conductor and the outside conductor (common).
- .3 Rotate the INTENSITY control clockwise slowly as you observe the voltage and current waveforms on the dual channel scope. The waveforms should be within 5 degrees of being in phase and oscillation should be stable. NOTE: If the signals start jumping out of phase, rotate the INTENSITY control CCW just past the level where the signals become stable and go to step .4 otherwise, proceed to step .5.
- .4 Adjust the 10 CM² OUTPUT TRIMMER (C4) through the access hole on the unit rear panel (see fig. 3 for location) for phase correction and the 10 CM² FEEDBACK TRIMMER (C7) through its access hole for oscillation stability. Repeat step .3.
- .5 Repeat step .3 for 50% duty cycle and 20% duty cycle. NOTE: If the oscillation is unstable, repeat step .4. Otherwise, proceed to step .6.
- .6 Replace metal caps over 10 CM² trimmer access holes on rear panel.
- .7 Remove the current probe adaptor and plug the applicator cable directly into the RF phono jack on the oscillator cover.



OSCILLATOR TRIMMER LOCATIONS

Figure 3

10. 10CM² APPLICATOR OUTPUT LEVEL AND DISPLAY (I-250 ONLY)
 - .1 Rotate the INTENSITY control fully clockwise and adjust the 10 CM² REF. ADJ (R9) on the control board for a reading of 20.5 watts on the UPM ultrasound meter.
 - .2 Adjust the 10 CM² WATTS adjustor (R46) on the control board for a front panel display of 20.5 watts when WATTS is selected.
 - .3 Adjust the INTENSITY control for a front panel display of 20.0 watts.
 - .4 Select W/CM² on the front panel and adjust the 10 CM² W/CM² adjustor (R45) for an indication of 2.35 W/CM² on the display.
11. 5 CM² OSCILLATOR ADJUSTMENT
 - .1 Check that the INTENSITY control is fully CCW. Then, remove jumper across Z 1.
 - .2 Connect the scope current probe around the center conductor of the current probe adaptor and connect the voltage probe between the center conductor and the outside conductor (common).
 - .3 Rotate the INTENSITY control clockwise slowly as you observe the voltage and current waveforms on the dual channel scope. The waveforms should be within 5 degrees of being in phase and oscillation should be stable. NOTE: If the signals start jumping out of phase, rotate the INTENSITY control CCW just past the level where the signals become stable and go to step .4 otherwise, proceed to step .5
 - .4 Adjust the 5 CM² OUTPUT TRIMMER (C4) through the access hole on the unit rear panel (see fig. 3 for location) for phase correction and the 5 CM² FEEDBACK TRIMMER (C7) through its access hole for oscillation stability. Repeat step .3.
 - .5 Repeat step .3 for 50% duty cycle and 20% duty cycle. NOTE: If the oscillation is unstable, repeat step .4. Otherwise, proceed to step .6.
 - .6 Replace metal caps over 5 CM² trimmer access holes on rear panel.
 - .7 Remove the current probe adaptor and plug the applicator cable directly into the RF phono jack on the oscillator cover.
12. 5CM² APPLICATOR OUTPUT LEVEL AND DISPLAY
 - .1 Rotate the INTENSITY control fully clockwise and adjust the 5CM² REF. ADJ. (R8 on I-250, R9 on I-240) on the control board for a reading of 10.5 watts on the UPM ultrasound meter in 100% duty cycle.
 - .2 Adjust the 5 CM² WATTS adjustor (R48 on I-250, R46 on I-240) on the control board for a front panel display of 10.5 when WATTS is selected.
 - .3 Adjust the INTENSITY control for a front panel display of 10.0 watts.
 - .4 Select W/CM² on the front panel and adjust the 5 CM² W/CM² adjustor (R47 on I-250, R45 on I-240) on the control board for a display of 2.50 W/CM².

- 13.-14. To insure continued compliance with FDA Regulations, calibration of the 2 CM² Applicator must be performed at the factory. Please return the entire unit to:

Chattanooga Corp.
101 Memorial Drive
P.O. Box 4287
Chattanooga, TN 37405

15. CHECK AND ADJUST MODULATED RF DUTY CYCLE

- .1 Select 5 CM² applicator and 20% duty cycle.
- .2 Rotate INTENSITY control fully clockwise.
- .3 Adjust R76 for a 21 % duty cycle for the 100 Hz modulated RF waveform displayed on the oscilloscope.
- .4 Select 50% duty cycle and again rotate the INTENSITY control from fully CCW to fully CW.
- .5 Adjust R73 on the control board for 53 % duty cycle for the modulated RF signal displayed on the oscilloscope.

16. CHECK THE US. OUTPUT ACCURACY

- .1 Compare the front panel display indications for each of the applicators to the power indicated on the UPM ultrasound meter at the power levels listed below.

5 CM² (Both models)

Display	UPM Meter	
	Min.	Max.
1.0 W	.86 W	1.14 W
2.0 W	1.72 W	2.28 W
5.0 W	4.3 W	5.7 W
7.0 W	6.0 W	8.0 W
10.0 W	8.6 W	11.4 W

10 CM² (I-250 Only)

Display	UPM Meter	
	Min.	Max.
2.0 W	1.72 W	2.28 W
5.0 W	4.3 W	5.7 W
10.0 W	8.6 W	11.4 W
15.0 W	12.9 W	17.1 W
20.0 W	17.2 W	22.8 W

NOTE: If the UPM meter readings are not between the min. and max. limits, repeat the output level and display adjustments.

- .2 Vary the line voltage from 108 VAC (198 VAC) to 132 VAC (242 VAC) and check that the ultrasound output remains within the limits listed above.
- .3 Select 50% duty cycle and check the peak power display accuracy by comparing the displayed values to the UPM meter indications by the following formula:

$$\text{POWER}_{\text{AVG.}} = (\% \text{ Duty Cycle}) (\text{Power}_{\text{Peak}})$$

5CM² (Both models)

Peak power Display	UPM Meter Average power	
	Min	Max.
1.0 W	.43 W	.57 W
2.0 W	.86 W	1.14 W
5.0 W	2.15 W	2.85 W
7.0 W	3.01 W	3.99 W
10.0 W	4.3 W	5.7 W

10 CM² (I-250 only)

Peak power Display	UPM Meter Average power	
	Min.	Max.
2.0 W	.86 W	1.14 W
5.0 W	2.15 W	2.85 W
10.0 W	4.3 W	5.7 W
15.0 W	6.5 W	8.5 W
20.0 W	8.6 W	11.4 W

4. Select 20% duty cycle and check the peak power display accuracy by comparing the displayed values to the UPM meter indications by the formula in step .3.

5 CM² (Both models)

Peak power Display	UPM Meter Average power	
	Min.	Max.
1.0 W	.172 W	.228 W
2.0 W	.344 W	.456 W
5.0 W	.86 W	1.14 W
7.0 W	1.20 W	1.60 W
10.0 W	1.72 W	2.28 W

10 CM² (I-250 only)

Peak power Display	UPM Meter Average power	
	Min.	Max.
2.0 W	.344 W	.456 W
5.0 W	.86 W	1.14 W
10.0 W	1.72 W	2.28 W
15.0 W	2.58 W	3.42 W
20.0 W	3.44 W	4.56 W

NOTE: If the UPM meter readings do not fall between the limits listed, repeat section 15, and recheck the output power for the duty cycle that was readjusted.

17. DECOUPLING CALIBRATION (I-240)

- .1 Select the 2 CM² applicator and rotate the INTENSITY control fully clockwise.
- .2 Place the 2 CM² applicator in a large container of water so that the ultrasound waves in the water will not be reflected back into the transducer.
- .3 Connect a digital voltmeter to the cathode of CR3 on the control board and record the voltage measured.
- .4 Lift the 2 CM² applicator out of the water so that half of the transducer face is in the water and there are not any ultrasound reflections back into the transducer.
- .5 Connect a digital voltmeter to pin 8 of U26 on the control board and adjust the 2 CM² DECOUPLING ADJ. (R81) slowly in the CCW direction until the voltage on pin 8 of U26 drops to approximately 0 volts.

OBSERVE:

1) Approximately 9 seconds after the U26-8 voltage drops to 0 volts the decoupling beeper will sound three times and the DECOUPLED L.E.D. (Red) will light.

2) On an oscilloscope, the waveforms at pin #4 on J1 should become a 20 Hz rectangular waveform with an off time of approximately 2 msec when the DECOUPLED L.E.D. lights.

3) The front panel display should indicate approximately 10% of maximum output during the decoupled time.

4) Approximately 25 seconds after the DECOUPLED L.E.D. lights, the beeper should beep continuously, the displayed power should drop to 0.00 and the ULTRASOUND ON L.E.D. should shut off.

- .6 Push the START pushbutton and rotate the INTENSITY control fully CCW and then back to the fully CW position.
- .7 Place the applicator in the water and lift it back out.

OBSERVE:

1) The DECOUPLED L.E.D. is off when the applicator is in the water and lights 9 seconds after the applicator is out of the water.

2) Replacing the applicator in the water should result in the DECOUPLED L.E.D. shutting off and the ultrasound output power returning to the set level.

- .8 Check that decoupling functions from 10% to 100% of maximum output in all three duty cycle modes.

NOTE: If the decoupling does not operate properly under these output conditions, monitor the D.C. voltage on pin 7 of U26 and adjust R81 on the control board so that the decoupling functions properly. Do not let the voltage at U26-7 get closer than 50 millivolts below the voltage measured in step.3.

- .9 Place the 5 CM² applicator in the water and turn the INTENSITY fully CW.
- .10 Measure the voltage on the cathode of CR3 on the control board.
- .11 Lift the applicator so that half of the transducer face is under water and no US. reflections are made back into the transducer.
- .12 Measure the voltage at pin 8 of U26 on the control board and adjust the 5 CM² DECOUPLING ADJ. (R80) slowly in the CCW direction until the voltage at U26-8 drops to approximately 0 volts.

- .13 Repeat the four observations of step .5.
- .14 Repeat steps .6 and .7.
- .15 Check that decoupling functions from 10% to 100% of maximum output in all three duty cycle modes.
NOTE: If the decoupling does not operate properly, monitor the D.C. voltage on pin 7 of U26 and adjust R80 on the control board so that the decoupling functions properly under these output conditions.

18. DECOUPLING CALIBRATION (I-250)

- .1 Select the 5 CM² applicator and rotate the INTENSITY control fully clockwise.
- .2 Place the 5 CM² applicator in a large container of water so that the ultrasound waves in the water will not be reflected back into the transducer.
- .3 Connect a digital voltmeter to the cathode of CR3 on the control board and record the voltage measured. 1.185VDC
- .4 Lift the 5 CM² applicator out of the water so that half of the transducer face is in the water and there are not any ultrasound reflections back into the transducer.
- .5 Connect a digital voltmeter to pin 8 of U26 on the control board and adjust the 5 CM² DECOUPLING ADJ. (R81) slowly in the CCW direction until the voltage on pin 8 of U26 drops to approximately 0 volts.

OBSERVE:

1) Approximately 9 seconds after the U26-8 voltage drops to 0 volts the decoupling beeper will sound three times and the DECOUPLED L.E.D. (Red) will light.

2) On an oscilloscope, the waveform at pin #4 on J1 should become a 20 Hz rectangular waveform with an off time of approximately 2 msec when the DECOUPLED L.E.D. lights.

3) The front panel display should indicate approximately 10% of maximum output during the decoupled time.

4) Approximately 25 seconds after the DECOUPLED L.E.D. lights, the beeper should beep continuously, the displayed power should drop to 0.00 and the ULTRASOUND ON L.E.D. should shut off.

- .6 Push the START pushbutton and rotate the INTENSITY control fully CCW and then back to the fully CW position.
- .7 Place the applicator in the water and lift it back out.

OBSERVE:

1) The DECOUPLED L.E.D. is off when the applicator is in the water and lights 9 seconds after the applicator is out of the water.

2) Replacing the applicator in the water should result in the DECOUPLED L.E.D. shutting off and the ultrasound output power returning to the set level.

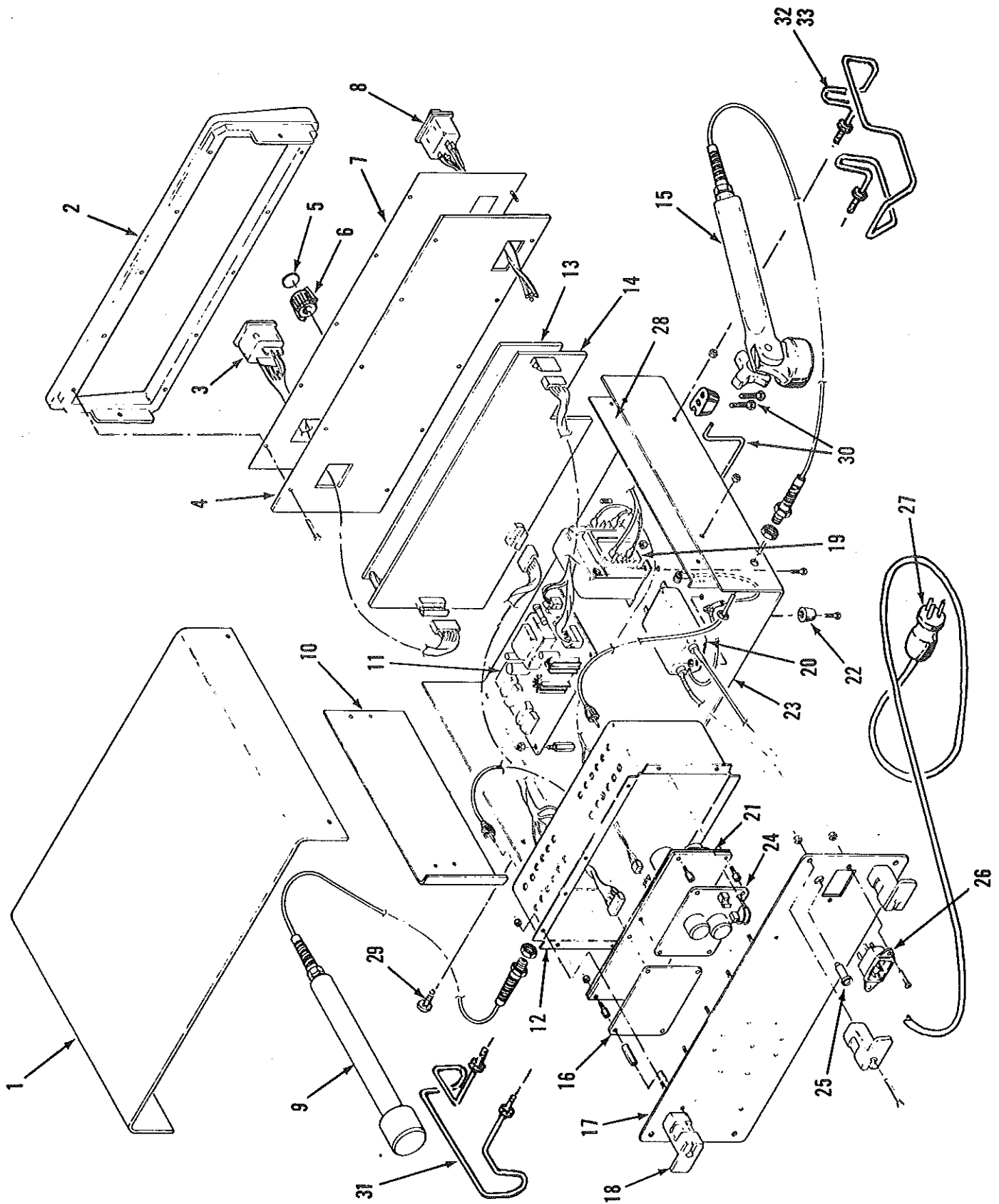
- .8 Check that decoupling functions from 10% to 100% of maximum output in all three duty cycle modes.

NOTE: If the decoupling does not operate properly under these output conditions, monitor the D.C. voltage on pin 7 of U26 and adjust R81 on the control board so that the decoupling functions properly. Do not let the voltage at U26-7 get closer than 50 millivolts below the voltage measured in step .3.

- .9 Place the 10 CM² applicator in the water and turn the INTENSITY fully CW.
- .10 Measure the voltage on the cathode of CR3 on the control board.
- .11 Lift the applicator so that half of the transducer face is under water and no US. reflections are made back into the transducer.
- .12 Measure the voltage at pin 8 of U26 on the control board and adjust the 10 CM² DECOUPLING ADJ. (R80) slowly in the CCW direction until the voltage at U26-8 drops to approximately 0 volts.
- .13 Repeat the four observations of step .5.
- .14 Repeat steps .6 and .7.
- .15 Check that decoupling functions from 10% to 100% of maximum output in all three duty cycle modes.

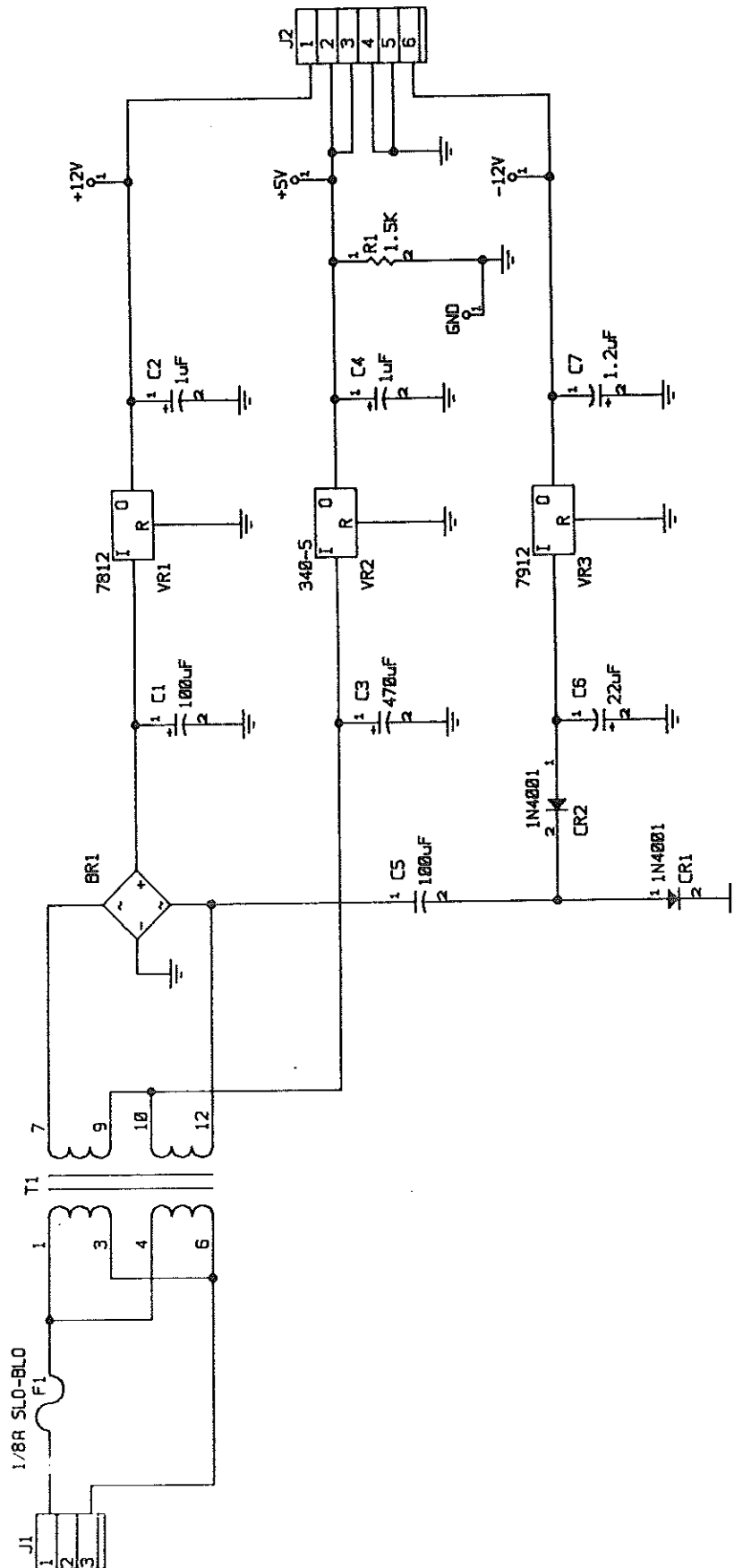
NOTE: If the decoupling does not operate properly, monitor the D.C. voltage on pin 7 of U26 and adjust R80 on the control board so that the decoupling functions properly under these output conditions.

Parts-Model 240/250 Ultrasound

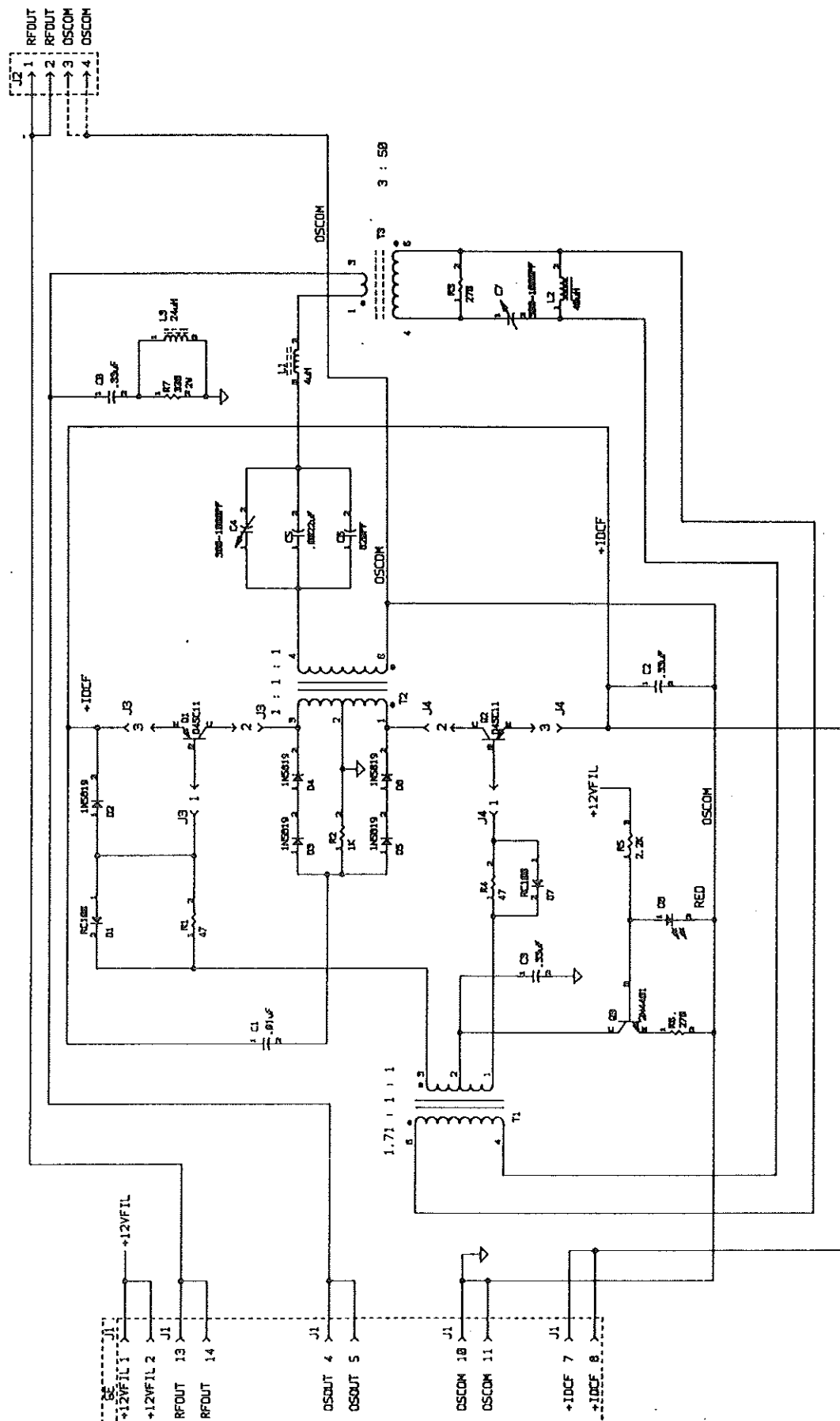


parts list

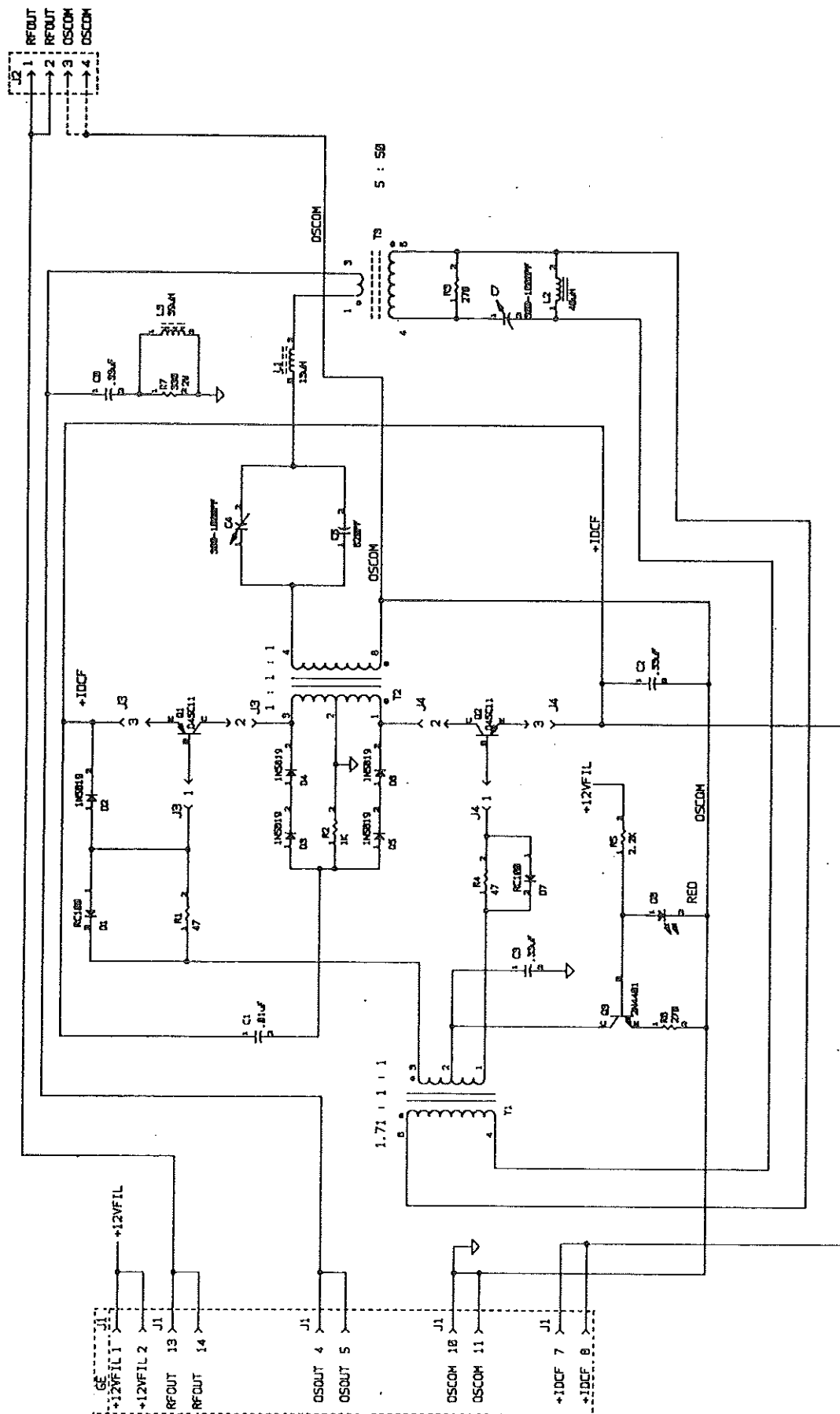
REF.	PART NO.	DESCRIPTION	QTY.
1	74176	Panel, Top, I-240/250, Pnt	1
2	74584	Bezel, 4.5" x 15", Gray	1
3	73941	Harness Assy, Timer Switch	1
4	73990	Panel, Front, I-240/250	1
5	74112	Cap, Knob, 21 MM, Gray	1
6	73972	Knob, 21 MM, Black	1
7	75545	Decal, Front Panel, I-240	1
8	73424	Switch, DPST, AC Power	1
9	74261	Applicator Assy, 2 CM ² , US.	1
10	73856	Bracket, MTG, Side, Right	1
11	73931	PCB Assy, RF, I-240/250	1
12	73988	Shield Assy, RF, I-240/250	1
13	73983	PCB Assy, Display, I-240/250	1
14	73985	PCB Assy, Control, I-240	1
15	73580	Applicator Assy, 5 CM ² , US.	1
16	74181	PCB Assy, OSC, 2 CM ²	1
17	73989	Panel, Rear, I-240/	1
18	73604	Holder, Cord	4
19	74322	Transformer, A41-80-36	1
20	70484	Filter, Line, 3A/250V	1
21	73987	PCB Assy, Power Supply, 20SC.	1
22	79115	Foot, Rubber, Black	2
23	73591	Panel, Bottom, Gray	1
24	71404	PCB Assy, OSC., 5 CM ²	1
25	70316	Fuseholder	1
26	74723	Receptacle, Power, AC	1
27	72453	Cordset, Power, Line, AC	1
28	73855	Bracket, MTG, Side, Left	1
29	79041	Jack, Banana, Black	1
30	73974	Stand, Tilt W/Rub. Feet	1
31	74960	Holder, Applicator, for 2 CM	1
32	74959	Holder, Applicator, Left	1
33	74958	Holder, Applicator, Right	1



Power Supply
Intellect 240/250
S. 73931

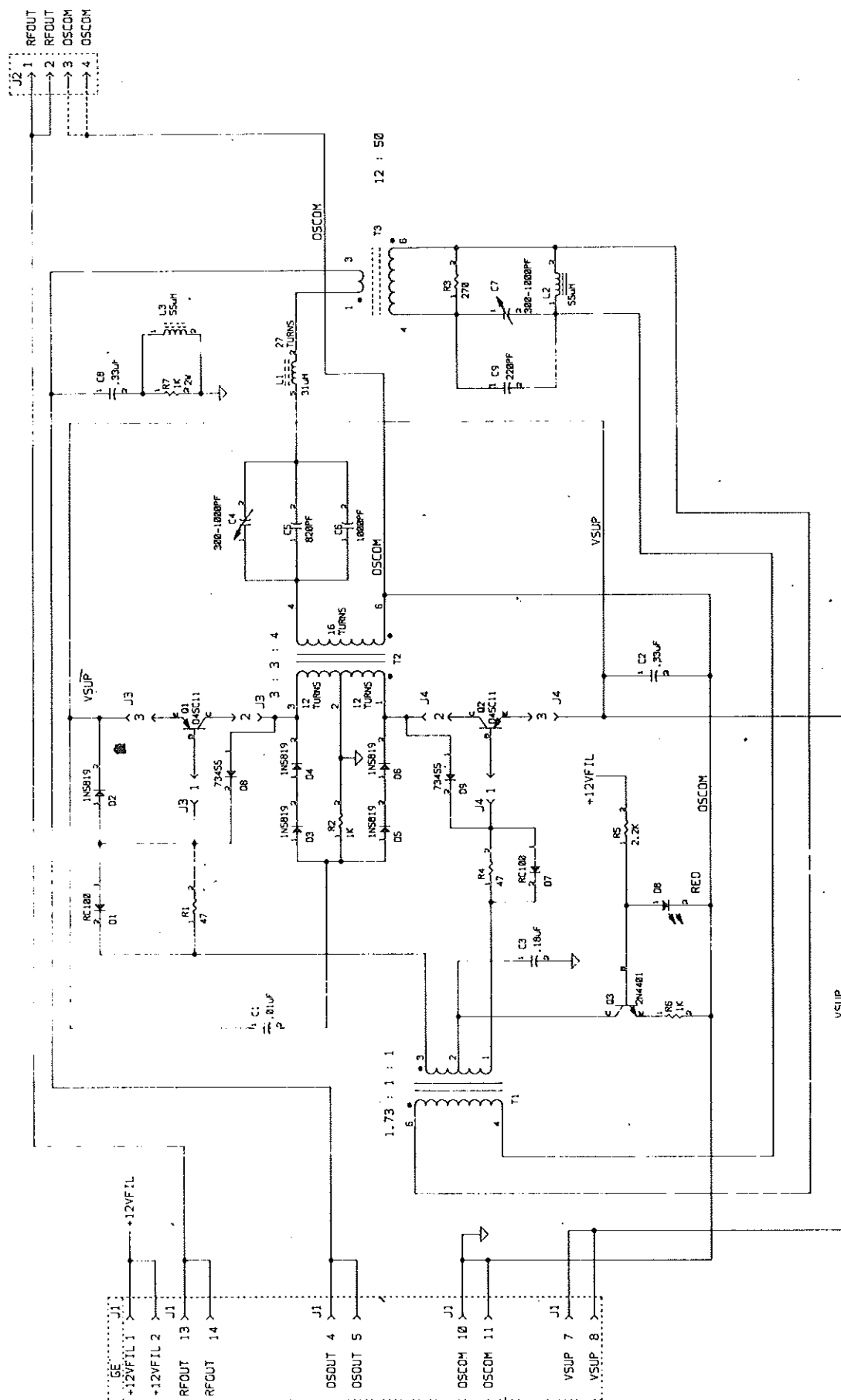


P.C. Board Assy. OSC. Power, 10 CM²
E.S. 71407



P.C. Board Assy., OSC. Power, 5 CM²
E.S. 71404

check D1-D6 2, 5, 10 cm

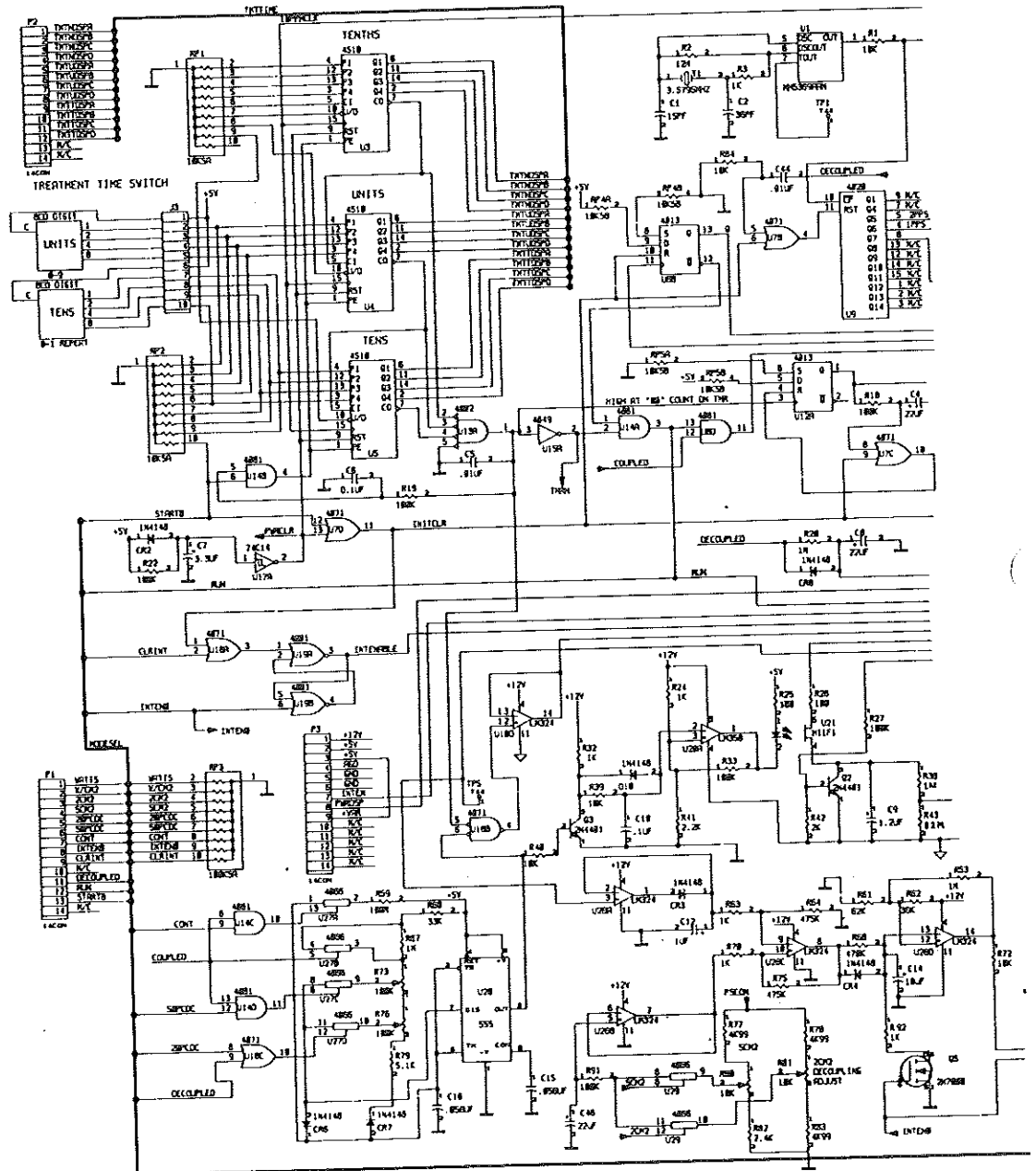


P.C. Board Assy., OSC. Power, 2 CM²
E.S. 74181

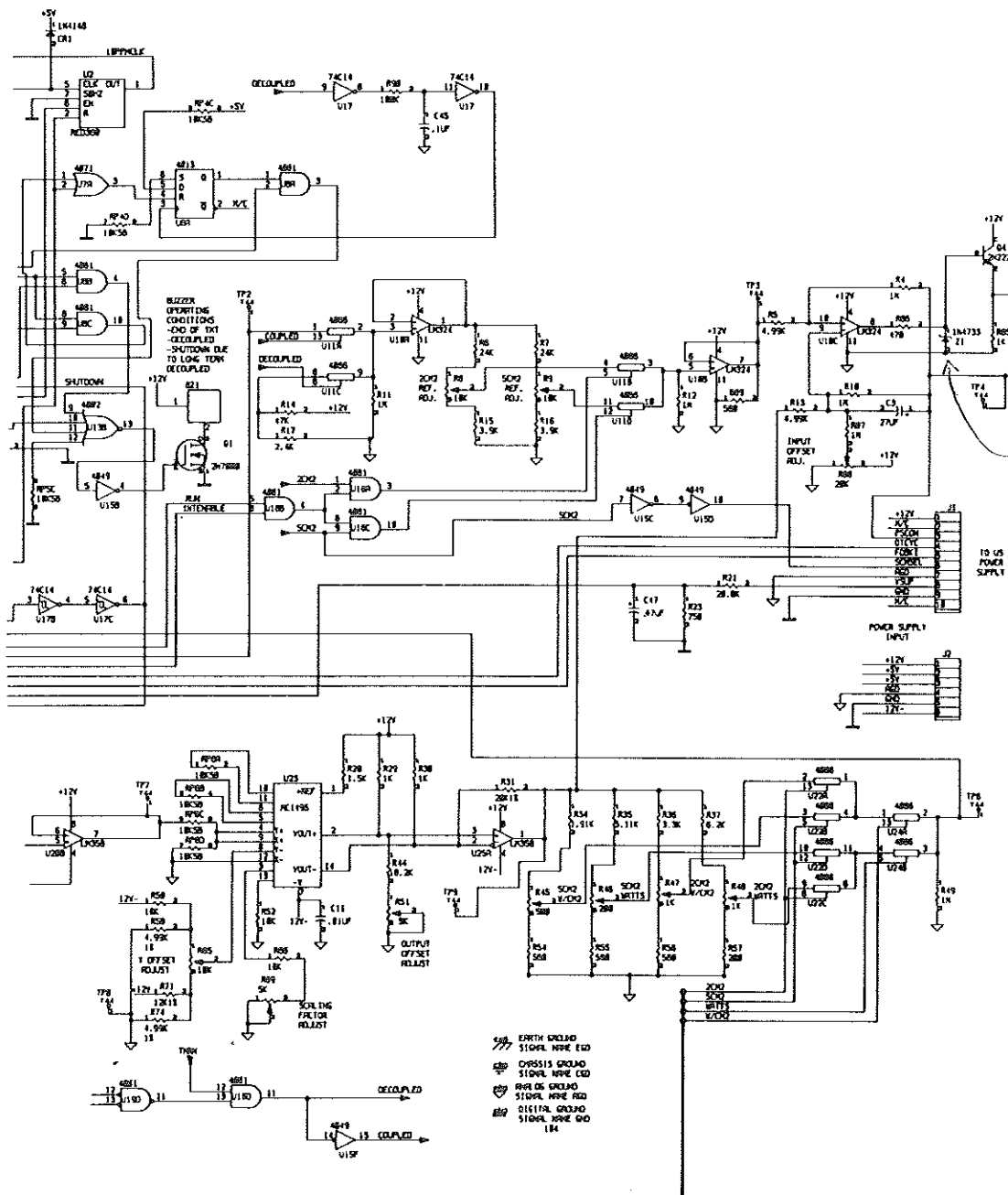




R47 = 2.22
R48 = 42

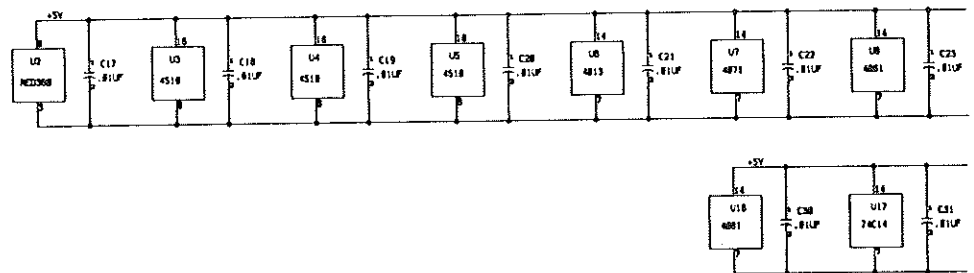


Tune all cap cw 601

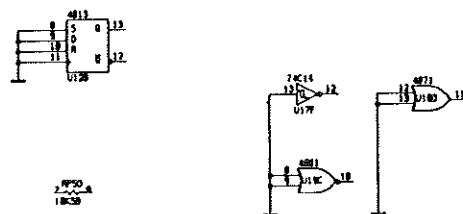


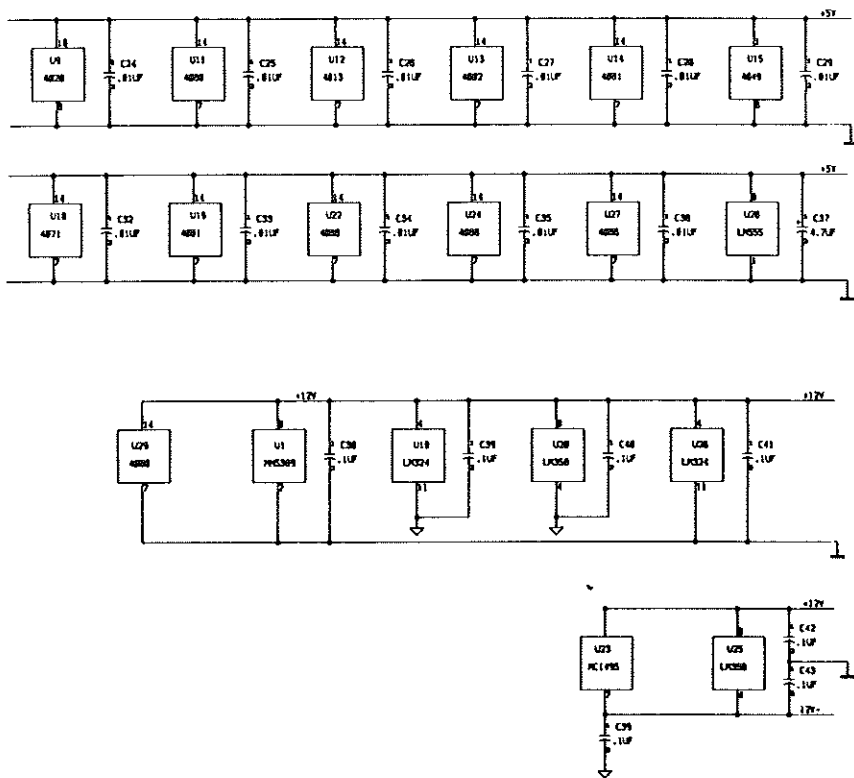
Control Board, US, 2 OSC I-240
S. 73985

SUPPLY WIRING AND DECOUPLING CAPACITORS



SPARE GATES





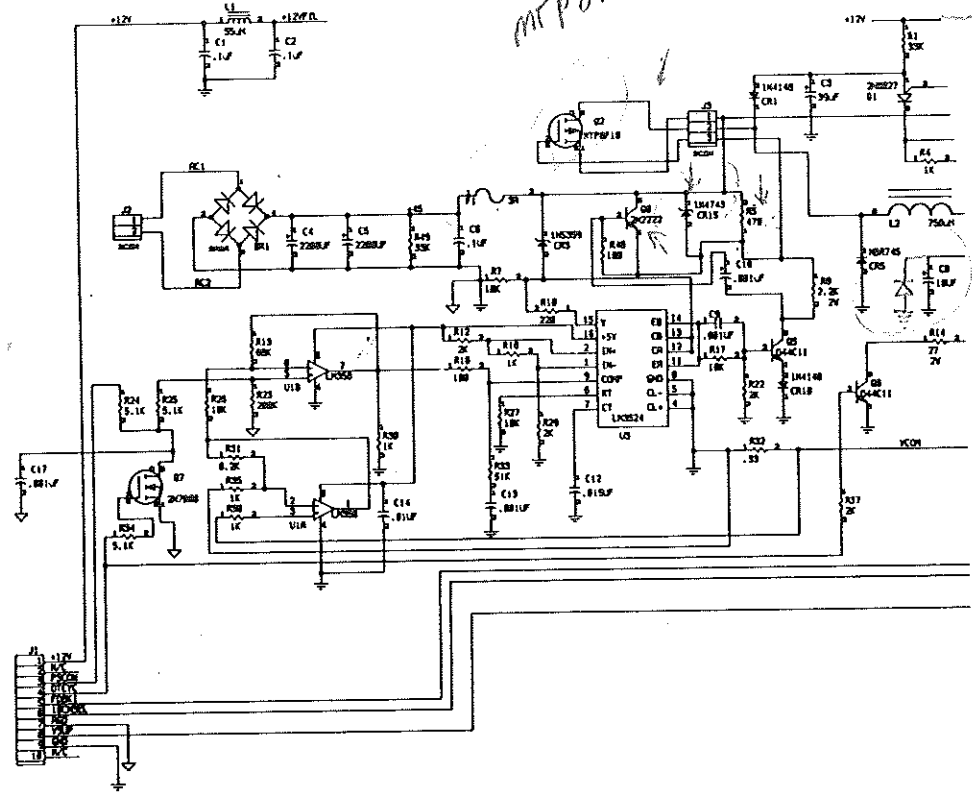
GND GROUND
 SIGNAL WAVE GND
 CHASSIS GROUND
 SIGNAL WAVE GND
 SIGNAL WAVE GND
 SIGNAL WAVE GND
 SIGNAL WAVE GND
 SIGNAL WAVE GND

Control Board, US, 2 OSC I-240
S. 73985

-0-3.54

1N4148

MTP8P10



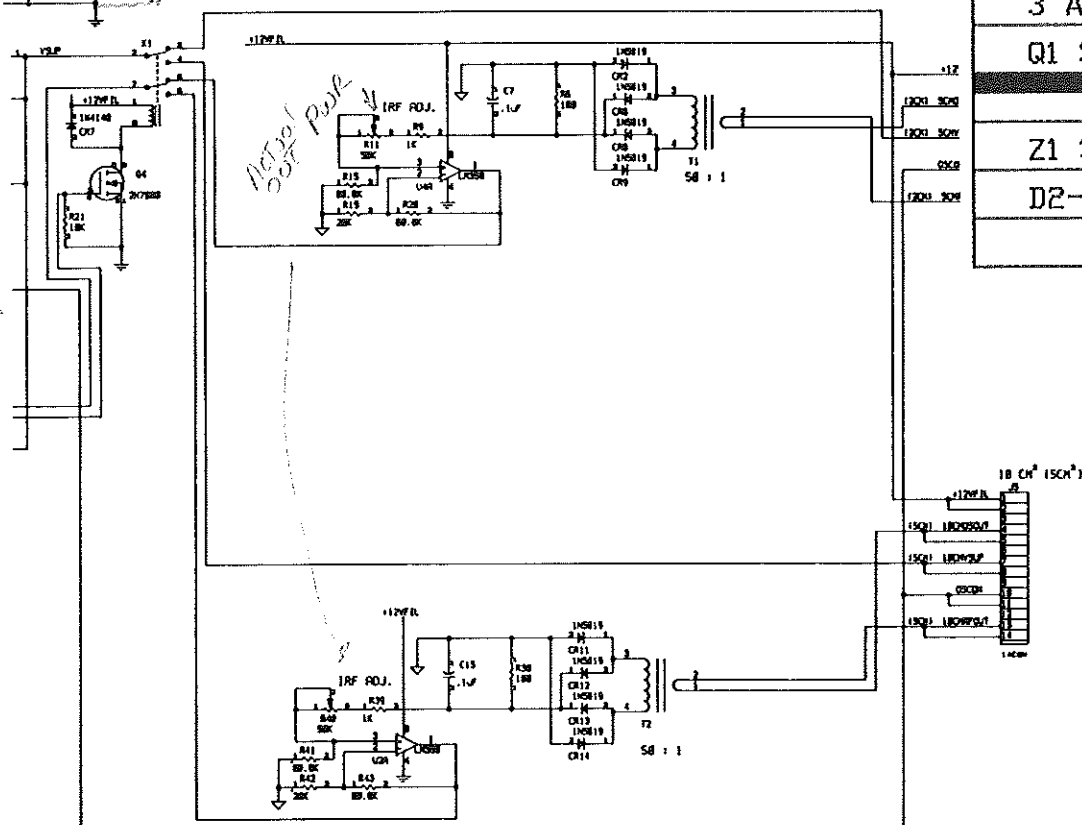
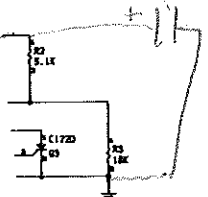
CP13
391
12-11-12




OSC power supply

Q2, Q4, Q7, uni junction

order from chart
for 240 from T.G.H.

6'2nd
Elec

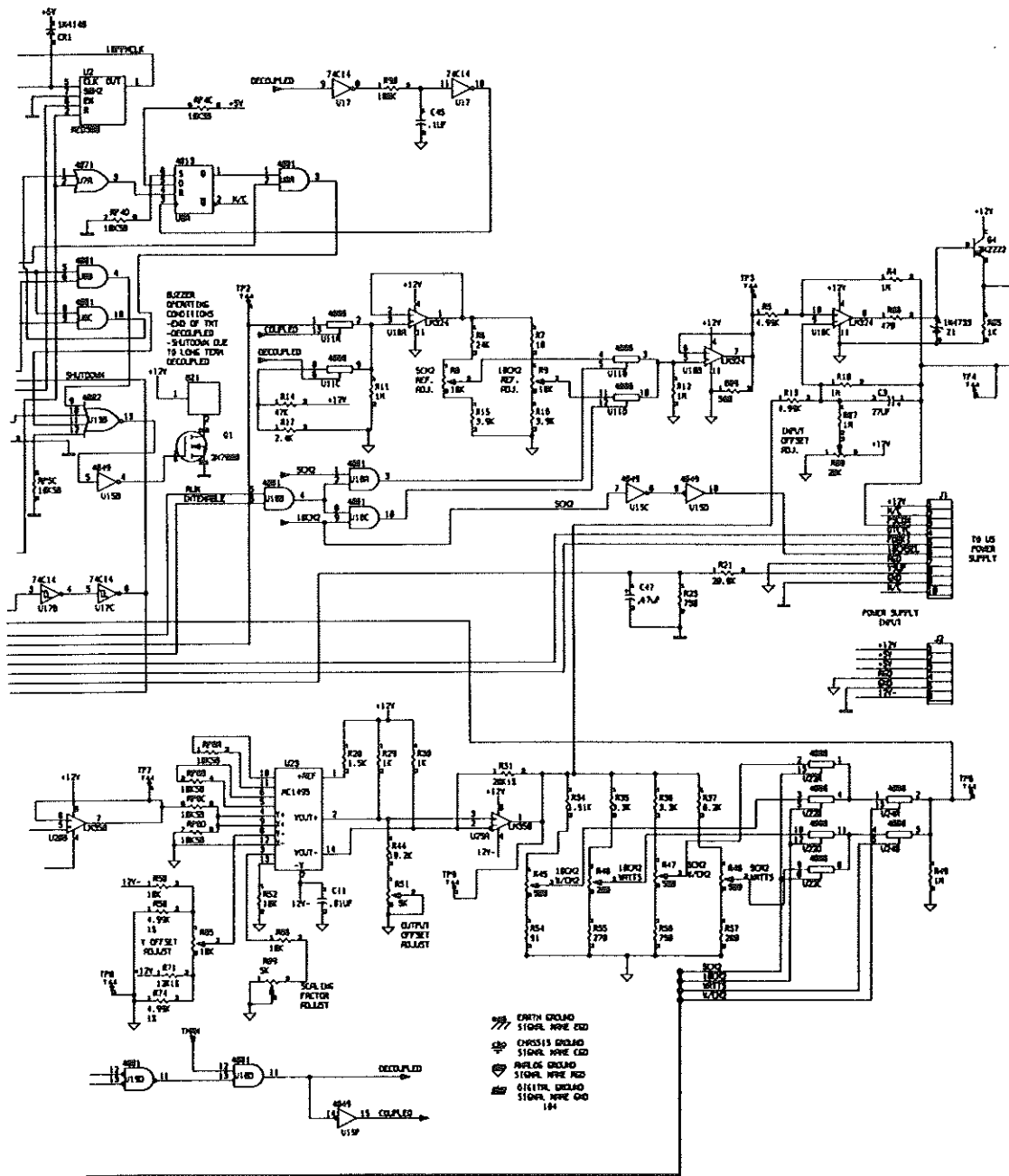


 POWER GROUND
 SIGNAL MODE GND
 ANALOG GROUND
 SIGNAL MODE AGND

DESIGNATORS	
LAST USED	SPACE
149	108
80	C11- C18
C17	CM
CR18	
IC1	
U4	
V2	
BR1	
J8	

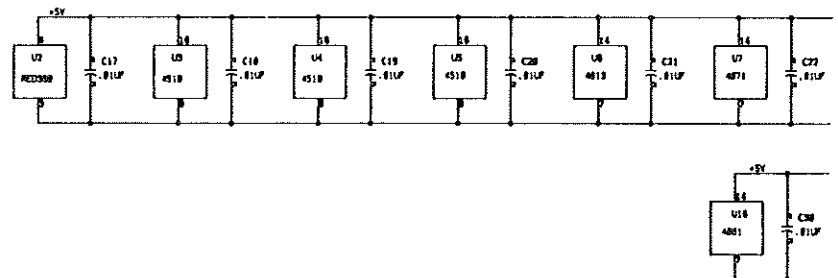
D2-D6 DIODE

35

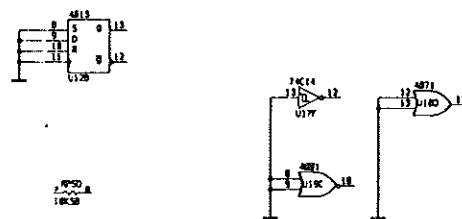


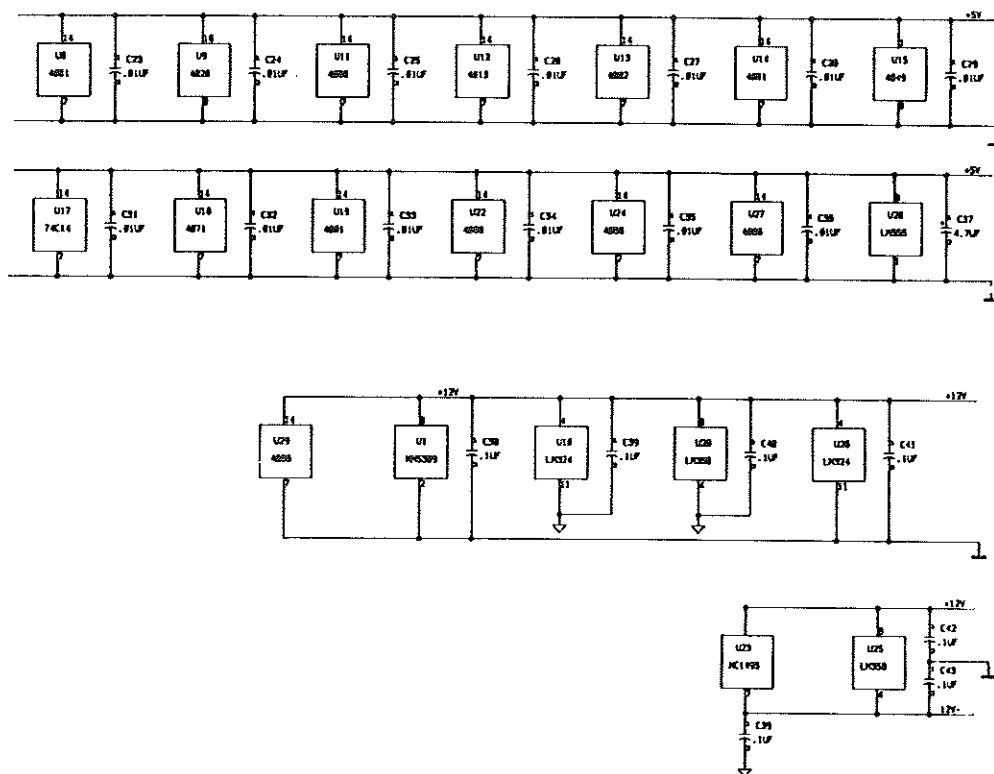
Control Board, US, 2 OSC, I-250
S. 74182

SUPPLY WIRING AND DECOUPLING CAPACITORS



SPARE GATES





**Control Board, US, 2 OSC, I-250
S. 74182**

Serial plate information.
Located on bottom of enclosure.

I 240-120V.

infect[®] MODEL 240 THERAPEUTIC ULTRASOUND GENERATOR POWER: 120V., 60HZ, 1/2AMP. MAX.

FCR ID 7004070 240 UNITED STATES OF AMERICA

DANGER: EXPLOSION HAZARD. DO NOT USE IN PRESENCE OF FLAMMABLE ANESTHETICS.
DANGER: RISQUE D'EXPLOSION. NE PAS EMPLOYER EN PRESENCE D'ANESTHETIQUES INFLAMMABLES.

CERTIFIED TO THE REQUIREMENTS OF THE CANADIAN ELECTRICAL CODE. CSA HAS NOT INVESTIGATED OTHER PHYSIOLOGICAL EFFECTS.
CERTIFIÉ SELON LES EXIGENCES DU CODE CANADIEN DE L'ELECTRICITE. L'ACNOR N'A PAS ETUDE LES AUTRES EFFETS PHYSIOLOGIQUES POSSIBLES.

CAUTION: FEDERAL LAW RESTRICTS THIS DEVICE TO SALE BY OR ON THE ORDER OF A LICENSED PHYSICIAN OR PRACTITIONER.
CAUTION: RISK OF BURNS OR FIRE. DO NOT USE NEAR CONDUCTIVE MATERIALS SUCH AS METAL BED PARTS, INNERSPRING MATTRESSES AND THE LIKE.
RENEW ELECTRODE CABLES UPON EVIDENCE OF DETEIORATION.

CAUTION: ELECTRICAL SHOCK HAZARD. DO NOT REMOVE COVER REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
WARNING: GROUNDING RELIABILITY CAN BE ACHIEVED WHEN THIS EQUIPMENT IS CONNECTED TO AN EQUIVALENT RECEPTACLE MARKED "HOSPITAL GRADE."

THIS DEVICE COMPLIES WITH REQUIREMENTS SET FORTH IN 21CFR 100.10 FCC TYPE APPROVED
CSC 7189 1 100HZ PULSE REP 100HZ

DUTY CYCLE	TEMPORAL PULSE / AVG INTENSITY RATIO	NO PPS	1
20%	TTTTT TTTT	100 PPS	1
50%	TTTTT TTTT	100 PPS	2
100%	TTTTTTTTTTTTTT	CONT	1

APPLICATOR DATA
MODEL: 74590 FREQ: 1.0 MHZ. FREQ: 1.0 MHZ
BNR 60 BNR 60
TYPE COLL TYPE COLL
AREA: 4.0 CM² AREA: 1.8 CM²
730050

CHATTANOOGA CORPORATION
CHATTANOOGA, TN 37405

MEDICAL EQUIPMENT

I 240-220V.

infect[®] MODEL 240 THERAPEUTIC ULTRASOUND GENERATOR POWER: 220V., 60HZ, 1/2AMP. MAX.

FCR ID 7004070 240 UNITED STATES OF AMERICA

DANGER: EXPLOSION HAZARD. DO NOT USE IN PRESENCE OF FLAMMABLE ANESTHETICS.
DANGER: RISQUE D'EXPLOSION. NE PAS EMPLOYER EN PRESENCE D'ANESTHETIQUES INFLAMMABLES.

CERTIFIED TO THE REQUIREMENTS OF THE CANADIAN ELECTRICAL CODE. CSA HAS NOT INVESTIGATED OTHER PHYSIOLOGICAL EFFECTS.
CERTIFIÉ SELON LES EXIGENCES DU CODE CANADIEN DE L'ELECTRICITE. L'ACNOR N'A PAS ETUDE LES AUTRES EFFETS PHYSIOLOGIQUES POSSIBLES.

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RENEW ELECTRODE CABLES UPON EVIDENCE OF DETEIORATION.

CAUTION: ELECTRICAL SHOCK HAZARD. DO NOT REMOVE COVER REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
WARNING: GROUNDING RELIABILITY CAN BE ACHIEVED WHEN THIS EQUIPMENT IS CONNECTED TO AN EQUIVALENT RECEPTACLE MARKED "HOSPITAL GRADE."

THIS DEVICE COMPLIES WITH REQUIREMENTS SET FORTH IN 21CFR 100.10 FCC TYPE APPROVED
CSC 7189 1 100HZ PULSE REP 100HZ

DUTY CYCLE	TEMPORAL PULSE / AVG INTENSITY RATIO	NO PPS	1
20%	TTTTT TTTT	100 PPS	1
50%	TTTTT TTTT	100 PPS	2
100%	TTTTTTTTTTTTTT	CONT	1

APPLICATOR DATA
MODEL: 74590 FREQ: 1.0 MHZ. FREQ: 1.0 MHZ
BNR 60 BNR 60
TYPE COLL TYPE COLL
AREA: 4.0 CM² AREA: 1.8 CM²
730050

CHATTANOOGA CORPORATION
CHATTANOOGA, TN 37405

MEDICAL EQUIPMENT

I 250-120V.

infect[®] MODEL 250 THERAPEUTIC ULTRASOUND GENERATOR POWER: 120V., 60HZ, 1/2AMP. MAX.

FCR ID 7004070 250 UNITED STATES OF AMERICA

DANGER: EXPLOSION HAZARD. DO NOT USE IN PRESENCE OF FLAMMABLE ANESTHETICS.
DANGER: RISQUE D'EXPLOSION. NE PAS EMPLOYER EN PRESENCE D'ANESTHETIQUES INFLAMMABLES.

CERTIFIED TO THE REQUIREMENTS OF THE CANADIAN ELECTRICAL CODE. CSA HAS NOT INVESTIGATED OTHER PHYSIOLOGICAL EFFECTS.
CERTIFIÉ SELON LES EXIGENCES DU CODE CANADIEN DE L'ELECTRICITE. L'ACNOR N'A PAS ETUDE LES AUTRES EFFETS PHYSIOLOGIQUES POSSIBLES.

CAUTION: FEDERAL LAW RESTRICTS THIS DEVICE TO SALE BY OR ON THE ORDER OF A LICENSED PHYSICIAN OR PRACTITIONER.
CAUTION: RISK OF BURNS OR FIRE. DO NOT USE NEAR CONDUCTIVE MATERIALS SUCH AS METAL BED PARTS, INNERSPRING MATTRESSES AND THE LIKE.
RENEW ELECTRODE CABLES UPON EVIDENCE OF DETEIORATION.

CAUTION: ELECTRICAL SHOCK HAZARD. DO NOT REMOVE COVER REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
WARNING: GROUNDING RELIABILITY CAN BE ACHIEVED WHEN THIS EQUIPMENT IS CONNECTED TO AN EQUIVALENT RECEPTACLE MARKED "HOSPITAL GRADE."

THIS DEVICE COMPLIES WITH REQUIREMENTS SET FORTH IN 21CFR 100.10 FCC TYPE APPROVED
CSC 7189 1 100HZ PULSE REP 100HZ

DUTY CYCLE	TEMPORAL PULSE / AVG INTENSITY RATIO	NO PPS	1
20%	TTTTT TTTT	100 PPS	1
50%	TTTTT TTTT	100 PPS	2
100%	TTTTTTTTTTTTTT	CONT	1

APPLICATOR DATA
MODEL: 74582 FREQ: 1.0 MHZ. FREQ: 1.0 MHZ
BNR 60 BNR 60
TYPE COLL TYPE COLL
AREA: 8.5 CM² AREA: 4.0 CM²
730050

CHATTANOOGA CORPORATION
CHATTANOOGA, TN 37405

MEDICAL EQUIPMENT

I 250-220V.

infect[®] MODEL 250 THERAPEUTIC ULTRASOUND GENERATOR POWER: 220V., 60HZ, 1/2AMP. MAX.

FCR ID 7004070 250 UNITED STATES OF AMERICA

DANGER: EXPLOSION HAZARD. DO NOT USE IN PRESENCE OF FLAMMABLE ANESTHETICS.
DANGER: RISQUE D'EXPLOSION. NE PAS EMPLOYER EN PRESENCE D'ANESTHETIQUES INFLAMMABLES.

CERTIFIED TO THE REQUIREMENTS OF THE CANADIAN ELECTRICAL CODE. CSA HAS NOT INVESTIGATED OTHER PHYSIOLOGICAL EFFECTS.
CERTIFIÉ SELON LES EXIGENCES DU CODE CANADIEN DE L'ELECTRICITE. L'ACNOR N'A PAS ETUDE LES AUTRES EFFETS PHYSIOLOGIQUES POSSIBLES.

CAUTION: FEDERAL LAW RESTRICTS THIS DEVICE TO SALE BY OR ON THE ORDER OF A LICENSED PHYSICIAN OR PRACTITIONER.
CAUTION: RISK OF BURNS OR FIRE. DO NOT USE NEAR CONDUCTIVE MATERIALS SUCH AS METAL BED PARTS, INNERSPRING MATTRESSES AND THE LIKE.
RENEW ELECTRODE CABLES UPON EVIDENCE OF DETEIORATION.

CAUTION: ELECTRICAL SHOCK HAZARD. DO NOT REMOVE COVER REFER SERVICING TO QUALIFIED SERVICE PERSONNEL.
WARNING: GROUNDING RELIABILITY CAN BE ACHIEVED WHEN THIS EQUIPMENT IS CONNECTED TO AN EQUIVALENT RECEPTACLE MARKED "HOSPITAL GRADE."

THIS DEVICE COMPLIES WITH REQUIREMENTS SET FORTH IN 21CFR 100.10 FCC TYPE APPROVED
CSC 7189 1 100HZ PULSE REP 100HZ

DUTY CYCLE	TEMPORAL PULSE / AVG INTENSITY RATIO	NO PPS	1
20%	TTTTT TTTT	100 PPS	1
50%	TTTTT TTTT	100 PPS	2
100%	TTTTTTTTTTTTTT	CONT	1

APPLICATOR DATA
MODEL: 74582 FREQ: 1.0 MHZ. FREQ: 1.0 MHZ
BNR 60 BNR 60
TYPE COLL TYPE COLL
AREA: 8.5 CM² AREA: 4.0 CM²
730050

CHATTANOOGA CORPORATION
CHATTANOOGA, TN 37405

MEDICAL EQUIPMENT

CHATTANOOGA CORPORATION

101 MEMORIAL DR / P.O. BOX 4287 CHATTANOOGA, TN 37405 / 615-870-2281