

# EC Declaration of Conformity

We: **FHC, Europe**  
of: **(TERMOBIT PROD srl)**  
**129 Barbu Vacarescu Str, Sector 2**  
**Bucharest 020272**  
**Romania**

declare that:  
Equipment: **Oscillating Tissue Slicer**  
Model: **OTS 5000: Catalog No.s 85-00-1 & 86-00-1**  
Serial Number: \_\_\_\_\_


in accordance with the following Directives:

73/23/EEC	Low Voltage Directive <i>and its amending directives</i>
89/336/EEC	Electromagnetic Compatibility Directive <i>and its amending directives</i>
98/37/EC	Machinery Directive <i>and its amending directives</i>

has been designed and manufactured to the following specifications:

EN61010-2001:	<i>Safety Requirements for electrical equipment for measurement, control, and laboratory use: Part 1 - General Requirements</i>
EN50081-1:1992	<i>Electromagnetic Compatibility – Generic emission standard: Part 1 - Residential, commercial, and light industry</i>
EN292-1: 1991	<i>Safety of machinery – Basic concepts, general principles for design Part 1: Basic terminology, methodology</i>
EN292-2/A1:1995	<i>Safety of machinery – Basic concepts, general principles for design Part 2: Technical principles and specifications</i>

I hereby declare that the equipment named above has been designed to comply with the relevant sections of the above referenced specifications. The unit complies with all essential requirements of the Directives.

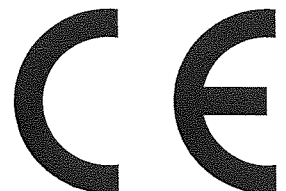
Signed by:  Date: June 11, 2009

Name: Frederick Haer  
Position: President, FHC

Done at: *FHC Inc., 1201 Main Street, Bowdoin, ME 04287 USA*

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## QUALITY INSPECTION SUMMARY

We have made every effort to manufacture this instrument to the highest quality standards. All assemblies have been thoroughly tested and inspected at the factory as follows:

Initial Assembly Inspection	_____	<input type="checkbox"/>
Initial QC Inspection/Calibration	_____	<input type="checkbox"/>
24 Hour Burn-In	_____	<input type="checkbox"/>
Final Performance Inspection	_____	<input type="checkbox"/>

Packaging Inspection                      Initials: \_\_\_\_\_ Date: \_\_\_\_\_

Items included with any catalog number may be labeled and packaged separately in shipping carton.

Description	Quantity	Checked
85-00-1 OTS5000		
Containing:		
OTS5000	_____	<input type="checkbox"/>
A993 Manual	_____	<input type="checkbox"/>
OTS Footswitch	_____	<input type="checkbox"/>
OTS Tray	_____	<input type="checkbox"/>
OTS Pedestal	_____	<input type="checkbox"/>
OTS Specimen Vise	_____	<input type="checkbox"/>
OTS Mounting Blocks	_____	<input type="checkbox"/>
OTS Magnifier	_____	<input type="checkbox"/>
Stainless Steel Slicer Blades	_____	<input type="checkbox"/>
1/16" hex Driver	_____	<input type="checkbox"/>
55-AUS   Australia	_____	<input type="checkbox"/>
55-CH    China	_____	<input type="checkbox"/>
55-DAN   Denmark	_____	<input type="checkbox"/>
55-EURO  Europe	_____	<input type="checkbox"/>
55-ISR   Israel	_____	<input type="checkbox"/>
55-ITA   Italy	_____	<input type="checkbox"/>
55-JA     Japan	_____	<input type="checkbox"/>
55-SAF   South Africa	_____	<input type="checkbox"/>
55-SWI   Switzerland	_____	<input type="checkbox"/>
55-UK    United Kingdom	_____	<input type="checkbox"/>
55-USA   North America	_____	<input type="checkbox"/>





*Providing Instrumentation and  
Apparatus for Cellular Research,  
Intraoperative Recording, and  
Microneurography; Micro-electrodes,  
Micropipettes, and Needles to the  
Neuroscience  
Community for 30 years.*

## **OTS5000 Tissue Slicer**

**85-00-1 OTS5000**



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## 0.2 **CONDITIONS FOR USE**

### **Intended Use**

The OTS5000 is intended for acquiring samples for: electrophysiology of fresh tissue, immunocytochemistry and immunohistochemistry, histology, cytology, botanical research, and polymer science.

### **Warnings**

The OTS5000 should not be disassembled beyond the indications of this manual. Any disassembly beyond this may affect function and calibration. Do not use phenols or ketones to clean the tray, as it will crack. Care should be taken when handling any blade. Do not contact the front edge of the blade. The OTS5000 should not be placed in the vicinity of high sources of electromagnetic phenomena. If repair is required please contact FHC at (207) 666-8190 for evaluation and to secure a return authorization number if necessary.

### **Storage Precautions**

Store at normal room temperatures between -34°C (-29°F) and 57°C (135°F). Do not expose to temperatures below -39°C (-29°F) or greater than 70°C (158°F), or a relative humidity of less than 10% or more than 100%, including condensation, or an atmospheric pressure less than 500hPa or greater than 1060hPa for long-term storage.

### **Sterilization**

Except for the pedestal and mounting blocks, the OTS5000 components are not designed for sterilization. (For questions on sterilization of the tray components, please contact the FHC Technical Services department at (207) 666-8190.) Any attempt to sterilize the non-tray components may result in malfunction or component failure.

### **Handling**

While a high degree of durability has been designed into the OTS5000, care should be taken not to drop the components. Do not force the tray on the platform, or the pedestal/vise in the tray. Place all cables and leads where they will not be inadvertently pulled or tangled.

# **1 OPERATIONAL MANUAL**

## **1.1 FEATURES**

- New slicer head design minimizes vibration that causes tissue distortion.
- User defined "travel window" reduces blade travel time between sections.
- User selectable multiple slice mode for "hands-free" preparation of many slices.
- Consistent live tissue slices of 10 microns achieved.
- Membrane switch keypad, separate from module, isolates circuitry from solutions, reduces "handedness", and improves ergonomics.
- Slice thickness up to 999 microns, set in 1 micron increments.
- Focused LED's mounted to blade arm for constant, direct, cold-source illumination.
- Two specimen mounting options: XY adjustable pedestal or vise/block arrangement.
- Removable, easy to clean tray.
- Accepts Razor, Glass, Diamond, and Sapphire blades.
- Precise bar graph displays of blade oscillation and advance speeds.
- Large LED display of slice counter/slice thickness.
- Removable X2 magnifier lens swings away when not in use.
- Removable slicer head for cleaning and maintenance.

## 1.2 **DESCRIPTION**

The OTS5000 is used for sectioning slice samples for use in the fields of electrophysiology of fresh tissue, immunocytochemistry and immunohistochemistry, histology, cytology, botanical research, and polymer science.

The new design of the slicer head minimizes Z-axis vibration, which dramatically improves slice surface integrity. This improvement is especially useful for fresh tissue where IR/DIC imaging methods are used.

To reduce the blade travel time between slices, the OTS5000 features a user-programmable travel window. This allows the user to set the range of blade travel customized to the specimen sample, reducing the time between slices. Once the range is set, the START/STOP button is used to toggle the sectioning sequence.

The OTS5000 allows the user to section in two different modes. In manual slice mode, the user can perform all movements of the blade arm using the keypad, or a combination of the keypad and footswitch. In multiple slice mode, the OTS5000 will automatically perform repeatable sequences.

The tray is made of molded clear polycarbonate for improved viewing of the slice operation. The tray is removable to facilitate specimen mounting and cleaning. Two focused LED's are installed in the blade head, which provide constant cold illumination of the specimen during the slicing process.

Two specimen mounting options are available to the user; a pedestal with forward/backward and side to side tilting adjustments, and a vise and mounting block (2 sizes provided) assembly. The blocks are used to quickly interchange multiple specimens on individual blocks.

The front panel of the OTS5000 has precise bar graph displays of the blade oscillation and advance speeds. A large, three digit display shows the number of slices performed, and the current slice thickness setting. (The display toggles when either of the thickness keypad buttons are pressed once.)

The modular configuration of the keypad allows for ambidextrous and ergonomic operation. The keypad incorporates membrane switch technology for durability and reliability in the laboratory environment.

The blade head is removable for occasional cleaning and maintenance. The blade clamp is designed to accept razor, sapphire, diamond, and glass blades.

A separate self-contained refrigeration system will be made available soon as an option.

## 1.3 **OPERATING ENVIRONMENT**

The OTS5000 has been designed to operate in a typical laboratory setup. It should be placed on a solid, flat surface that is level and free from contaminants and vibration. The OTS5000 should not be placed or used near or during high sources of electromagnetic phenomena.

## 1.4 INVENTORY

### 1.4.1 ITEMS DESCRIBED IN THIS MANUAL

*Items are included under the following catalog numbers:*



#### **1 ea. 85-00-1 OTS5000**

Includes: OTS5000

OTS Footswitch

OTS Tray

OTS Magnifier

OTS Pedestal  
OTS Specimen Vise  
OTS Mounting Blocks (2 sizes)  
Stainless Steel Slicer Blades (25 ea.)  
1/16" Hex Driver  
A993 Manual (Not Shown)

#### **1.4.2 ADDITIONAL ITEMS REQUIRED FOR OPERATION**

*The following additional items are ORDERED SEPARATELY:*

1 ea. 66-EL-LC-XXX Line Cord (Country specific see sec 2.1.4 of this manual for catalog number)

#### **1.4.3 REPLACEMENT ITEMS**

80-11-6	Stainless Steel Slicer Blades (25ea.)
80-12-2	OTS Mounting Blocks (1/2")
85-12-0	OTS Mounting Blocks (1")
85-13-0	OTS Specimen Vise
85-00-2	OTS Tray
85-00-3	OTS Pedestal
85-00-4	OTS Magnifier
85-00-5	OTS Footswitch

#### **1.4.4 OPTIONAL ACCESSORIES**

*The following accessories are available:*

80-12-1 Glass Blade Holder  
85-00-3 OTS Pedestal Surface  
85-00-6 OTS Sapphire Blade

### **1.5 CONCEPTS**

#### **1.5.1 DESIGN DESCRIPTION**

The OTS5000 slices samples of fresh and fixed tissue, as well as plant and polymer material using an oscillating blade. An embedded microcontroller is used to digitally control functions such as blade position, advance speed, and automatic slice performance. Membrane switch technology in the manual control keypad and polymer packaging protects against corrosion from the laboratory environment. The blade arm is designed to eliminate unnecessary vibration to ensure slice integrity. Cold source focused lighting and a clear tray allow improved visibility.

## 1.6 **TECHNICAL SUMMARY**

### 1.6.1 **SPECIFICATIONS**

#### **OTS5000:**

**Vertical Travel:** 28mm

**Slice Thickness:** adjustable from 1 to 999 microns in 1 micron increments

**Blade Speed:** adjustable from 50 - 5000 cycles per minute

**Blade Angle Adjustment:** adjustable from 15 to 35 degrees

**Blade Travel:** 35mm total

**Blade Types:** Sapphire, Razor, Diamond, Glass

**Blade Advance Speed:** continuously adjustable from 0 – 2.5mm per second

**Blade Reverse Speed:** 2.5mm per second

**Specimen Size:** 25(w) x 25(d) x 15(h) mm maximum volume.

**Magnifier:** 4" diameter, X2 lens mounted on 12" (30cm) gooseneck, 9" working distance

**Lighting:** Focused LED's mounted on the blade arm.

**Dimensions:** Slicer: 27cm x 40cm x 21.5cm (10.5" x 16" x 7.5")  
Keypad: 17cm x 8.5cm x 3.4cm (6.7" x 3.4" x 1.35")

**Weight:** 13kg (30lbs)

**Working space requirements:** 12"w x 18"d x 10"h (30 x 45 x 25cm).

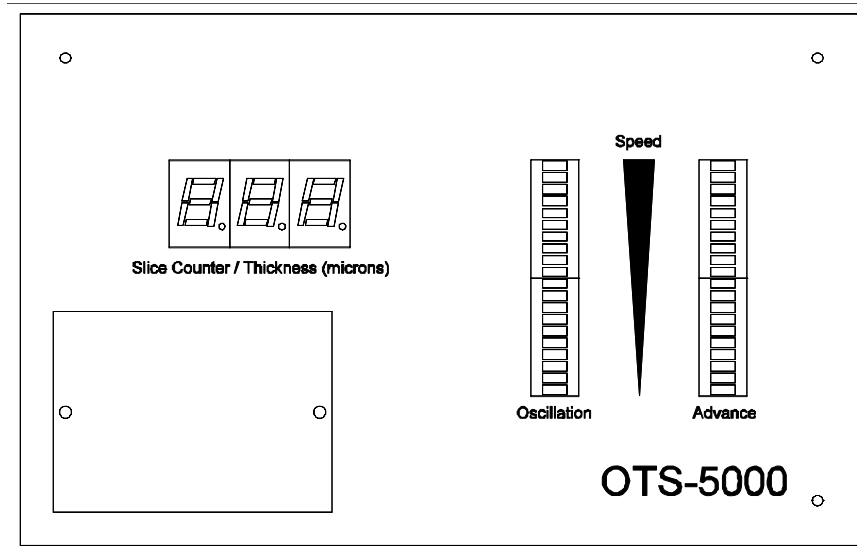
**Power requirements:** 85-265VAC, 50-60 Hz, 500mA max universal power input. See Section 2.1.4 for instructions on selecting line cord.

**Display:** 3 segment LED display of slice counter and thickness. (Changes with appropriate buttons.) 20 segment bar graph LED display of blade oscillation and advance speed.

**Specimen Mount:** X,Y axis adjustable pedestal: 1 3/4" x 2 1/2"

**Mounting blocks :** 1/2" x 1/2" x 1/2" (3 ea.)  
1" x 1" x 1" (3 ea.)

## 1.6.2 CONTROLS/CONNECTORS

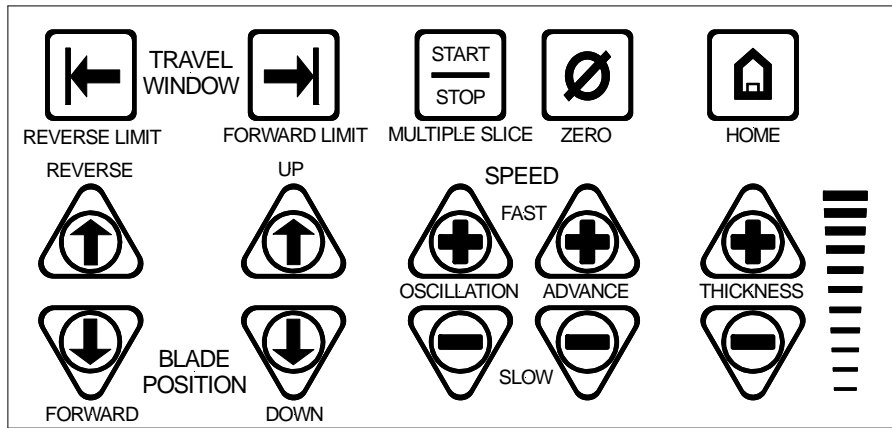


### Display – OTS5000 Front Panel

**Slice Counter / Thickness:** Displays a count of the number of slices from a user defined zero reference. When prompted, displays the slice thickness setting in microns.

**Oscillation:** Displays the speed of the blade oscillation in bar graph form. Each line of the graph represents a division between 0 and 5000 cycles per minute. A blinking bar indicates that the setting is half-way to the next bar.

**Advance:** Displays the speed of the blade advance in bar graph form. Each line of the graph represents a division between 0 and 2.5 mm per second. A blinking bar indicates that the setting is half-way to the next bar.



## Controls – OTS5000 Keypad

### **Blade Position:**

**Forward:** Moves the blade arm forward at the set advance speed, and begins blade oscillation. Press once to begin movement, again to stop.

**Reverse:** Moves the blade arm back at the maximum travel speed. Press once to begin movement, again to stop.

**Up:** Moves the blade arm up. Momentarily pressing the button moves the blade arm the set thickness amount. Pressing the button for longer than 1 second moves the blade at the fastest travel speed.

**Down:** Moves the blade arm down. Momentarily pressing the button moves the blade arm the set thickness amount. Pressing the button for longer than 1 second moves the blade at the fastest travel speed.

### **Speed:**

**Oscillation:** Pressing these buttons increments (+) and decrements (-) the blade oscillation speed.

**Advance:** Pressing these buttons increments (+) and decrements (-) the blade arm advance speed

### **Thickness:**

**Thickness:** Pressing these buttons adjusts the slice thickness. Pressing momentarily changes the setting in 1 micron increments. Holding for longer than 1 second causes 10 micron changes.

### **Travel Window:**



**Reverse Limit:** Pressing this button sets the position for the blade arm to start the slice process from during multiple slice mode. The limit can be changed by first pressing Start/Stop, then using the blade position buttons to reposition the new limit. Pressing this button again will set the new limit.

**Forward Limit:** Pressing this button sets the position for the blade arm to stop, return to the reverse limit, and start a new slice during multiple slice mode. The limit can be changed by first pressing Start/Stop, then using the blade position buttons to reposition the new limit. Pressing this button again will set the new limit.

**WARNING:** *If the Forward Limit is set behind the Reverse limit, the arm will continuously step down without moving forward. If this occurs, press the Start/Stop button to stop movement and correctly set the limits.*

**Multiple Slice:**

**Start/Stop:** Pressing this button enable the travel windows, and causes the OTS5000 to begin slicing in multiple slice mode. Pressing this button once will cause the blade arm to move forward, and oscillate. It will continue until it reaches a forward limit, (travel window or mechanical) stop, return to the reverse limit, step down the selected thickness, and begin another slice. Pressing the button during this process will cause the arm and oscillation to stop and wait for a command. The multiple slice process will continue until the lowest mechanical limit is reached. It will then automatically return to the home position. (full up and back)

**Warning:** *Due to the variance in blade angle settings, it is possible for the blade to run into the pedestal or mounting block surface before reaching the lowest mechanical limit.*

**Zero:**

**Zero:** Pressing this button resets the slice counter display to read all "0".

**Home:**

**Home:** Pressing this button will cause the blade to return to its full up and full back "home" position. Blade arm needs to be at rest before pressing the Home button.

### 1.6.3 COMPATIBILITIES

The OTS5000 is compatible with most commercially available glass, razor, sapphire, and diamond blades. For questions on blade compatibility, contact the FHC Technical Services department at (207) 666-8190.

### 1.7 ILLUSTRATIVE PROCEDURE

The OTS5000 can be operated in two modes. In manual slice mode, the user can perform all movements of the blade arm using the keypad, or a combination of the keypad and footswitch. In multiple slice mode, the OTS5000 will automatically perform repeatable sequences.

1. Ensure that the OTS5000 is installed correctly.
2. Activate power to the unit and position the blade arm at the full up and back ("Home") position by pressing the HOME button on the keypad.
3. Remove the tray from the unit by loosening the two thumbscrews on both sides of the bottom of the tray. Slide the tray forward off of the base.
4. Remove the pedestal from the tray. The pedestal can be removed by loosening the post thumbscrew a half turn. Grasp the thumbscrew and pivot pin, lift the pedestal straight up. Alternately, remove the vise in the same manner if using the vise/mounting block arrangement.
5. Prepare the bath medium. Set aside a small amount in a beaker. Place both in an ice bath or other to cool.
6. Clean the pedestal surface or mounting block. Ensure that the surface is completely dry.
7. Rapidly excise the tissue. Cut the structure of interest into a block leaving a minimum of excess (particularly connective) tissue. Continuously bathing the tissue with an eyedropper of cooled medium during the trimming process is suggested.
8. Turn the side of the tissue to be bonded up and blot as dry as possible. Apply a thin layer of tissue adhesive to the pedestal or block surface, and immediately position the dry side of the sample on it, ensuring that a strong bond is made.
9. Position the pedestal in the tray. Orient the pedestal angle if desired. Alternately secure the mounting block in the vise. Position the vise/block setup in the tray.
10. Immediately fill the tray with cooled, oxygenated medium. Ensure that the sample is covered by a millimeter or two.
11. Position a new blade in the blade holder and tighten securely. Cleaning both slides of the blade with acetone or alcohol is suggested. Set the blade angle, being careful not to touch the blade edge.
12. Set the Advance speed to 15-20 , using the appropriate keypad buttons, to position the blade to an initial slicing position behind the sample.
13. If slicing in Multiple Slice mode, set the reverse limit at this point by pressing the REVERSE LIMIT button in the TRAVEL WINDOW section of the keypad.
14. Set the Oscillation and Advance speeds using the appropriate keypad buttons to perform the initial slice. It is a good practice to make the first slice rather large to initially prepare the sample.
15. Press the FORWARD button on the keypad once to begin the slice process. When the blade has cleared the slice sample, press the FORWARD button again to stop.
16. If slicing in Multiple Slice mode, set the forward limit by pressing the FORWARD LIMIT button in the TRAVEL WINDOW section of the keypad.

17. Once the initial slice is performed, press the REVERSE button once to return the blade to a convenient position behind the sample. Press the REVERSE button again to stop movement. Alternately, press the START/STOP button to reposition the blade to the travel window Reverse limit.
18. Reset the Oscillation and Advance speeds if desired to begin performing slices of the desired thickness in either Manual or Multiple Slice mode.
19. Perform slices by either manually performing all blade arm movements using the keypad (or footswitch and keypad combination), or using the START/STOP button to begin slicing within the set Travel Window.
20. When slicing and harvesting is completed, discard the medium and any unused samples. Remove the pedestal or vise/block from the tray. Clean the surface of the pedestal or block by scraping with a used blade and wash with alcohol.

## **2 REFERENCE MANUAL**

## 2.1 REFERENCE INFORMATION

### 2.1.1 PACKAGING

The OTS5000 is enclosed in a two-piece (bottom and back, top) ABS UL94V0 plastic enclosure . The overall dimensions are 27cm x 40cm x 21.5cm (10.5" x 16" x 7.5") The top portion is connected to the interior chassis on the top of the unit, the back panel, and the bottom portion of the case through the baseplate.

### 2.1.2 MOUNTING

The OTS5000 is designed as a stand-alone unit. It is not designed to be rack mounted.

### 2.1.3 INSPECTION

FHC Modules are factory checked and calibrated but should be carefully inspected upon receipt, before using, or activating power. If any exterior damage to the shipping carton is noted, the instrument(s) should be inspected for obvious physical damage. The contents of each package should be physically checked against the inventory list (sec. 1.3) to determine shortages or errors in inventory.

### 2.1.4 POWER CONNECTIONS

The OTS5000 is powered through an internal 12V power supply. (input:85-265VAC, 50-60Hz, 500mA max) An international pattern Line Cord (not shown) is ordered separately, and is specified by country per the catalog number. (See table below for catalog numbers.) The power entry uses double pole switching and fusing. (2 ea. 5X20, 1/2 amp slo-blo fuses) Contact Technical Services at (207) 666-8190 for assistance.

66-EL-LC-AUS	Australia
66-EL-LC-CH	China
66-EL-LC-DAN	Denmark
66-EL-LC-EURO	Europe
66-EL-LC-ISR	Israel
66-EL-LC-ITA	Italy
66-EL-LC-JA	Japan
66-EL-LC-SAF	South Africa
66-EL-LC-SWI	Switzerland
66-EL-LC-UK	United Kingdom
66-EL-LC-USA	North America

To replace fuses:

1. Remove line cord if applicable
2. Remove fuse drawer located between the line cord entry and power switch by squeezing the tabs on each end of the drawer, and pulling out.
3. Replace fuses with the correct value (2 ea. 5X20, 1/2 amp slo-blo)
4. Insert drawer back into slot until tabs "click".

### 2.1.5 WARRANTY

All FHC products are unconditionally guaranteed against defects in workmanship for one year from date of shipment as long as they have been exposed to normal and proper use. Although the one-

year warranty may have expired, please contact our Service Department before attempting any repairs or alterations. Many of these repairs will still be performed at the factory at no charge to the customer.

### 2.1.6 **POLICIES**

1. TECHNICAL SUPPORT: It is our policy to provide our customers with the most comprehensive technical support in the industry. If any questions arise or problems occur, we encourage you to call or write and we promise to promptly and comprehensively respond to your requirements.

2. TRADE-UP POLICY: It is our policy to offer customers trade-up ability as new and/or expanded capabilities for their instruments are announced. In many cases, full credit will be given. In general, we will allow 100% credit for two years and depreciate 20% per year thereafter. Please contact our Marketing Department for information relating to your particular situation.

### 2.1.7 **SERVICE**

Should service be required, please contact our Service Department for a return authorization number and instructions (207-666-8190). Please have the serial number on hand (located on the back panel). Carefully pack the instrument before returning.

Please include a note indicating:

1. The model number and purchase date of the instrument
2. The person to contact if questions arise
3. A note stating that the unit is free of biological contaminants and the "symptoms" indicating that repair is necessary

If the instrument is not covered by the warranty, a quotation will be forwarded to the sender detailing the repairs necessary and charges, before repair is begun.

## 2.2 **INSTALLATION**

### **Initial Installation:**

1. Set the unit on a solid level surface.
2. Install the line cord into the receptacle on the back of the unit.
3. Ensure power switch on the back panel is in the "Off" position. (Indicated by the O side of the rocker switch pressed in.)
4. Plug the line cord into a properly grounded wall receptacle.

### **Foot Pedal Installation:**

1. Ensure power switch on the back panel is in the "Off" position. (Indicated by the O side of the rocker switch pressed in.)
2. Install the foot switch plug into the ¼" jack located on the back panel.

## 2.3 **FUNCTIONAL CHECKOUT**

1. Ensure that the unit is installed correctly per section 2.2.

2. Activate power using switch on the back panel. (Indicated by the I side of the rocker switch pressed in.)
3. Ensure that the LEDs in the front of the blade head are illuminated.
4. Ensure that the three digit display illuminates, and reads "000". If the display reads otherwise, press the ZERO button and ensure that it displays "000".
5. Ensure that both bar graph LED's are at 10 if this is the initial checkout. If this is a yearly checkup, use the appropriate SPEED buttons to set both displays to 10.
6. Press the OSCILLATION "+" button repeatedly to advance the display to 15. Ensure that the display moves up and alternates between blinking and moving to the next bar. Hold the "+" key down. Ensure that after one second the display advances rapidly to the top (20).
7. Press the OSCILLATION "-" button repeatedly to retract the display to 15. Ensure that the display has moved down and alternates between blinking and moving to the next bar. Hold the "-" key down. Ensure that after one second the display retracts rapidly to the bottom (0).
8. Repeat steps 6 and 7 using the ADVANCE "+" and "-" buttons. When complete use the appropriate buttons to return both displays to 10.
9. Press either of the THICKNESS buttons once. Ensure that the three digit display reads "100" if this is the initial checkout. If this is a yearly checkup, use the appropriate THICKNESS buttons to set to 100.
10. Press the THICKNESS "+" button repeatedly. Ensure that the display increments by one with each press of the button. The first press would cause the display to show the current thickness if it was previously showing the slice count. Hold the THICKNESS "+" button down. Ensure that after one second the display advances rapidly.
11. Press the THICKNESS "-" button repeatedly. Ensure that the display decrements by one with each press of the button. The first press would cause the display to show the current thickness if it was previously showing the slice count. Hold the THICKNESS "-" button down. Ensure that after one second the display advances rapidly.
12. Using the THICKNESS buttons, set the slice thickness to 500.
13. Press the HOME button. If this is the initial checkout, no movement of the blade arm should occur. If this is a yearly checkout, the blade arm may return to its home position if it was not previously returned to it.
14. Press the DOWN BLADE POSITION button once. You should observe the blade arm moving down. Ensure that the Slice Counter display has incremented by one. Hold the DOWN button. Ensure that the blade arm moves continuously down. Releasing the DOWN button stops movement.
15. Repeat #14 with the UP button. Ensure that the blade arm moves up a step amount when pressed once, and moves up continuously when held down.
16. Press the FORWARD button once. Ensure that the blade begins oscillating and moving forward. Press the FORWARD button again, ensure that the blade stops all movement.
17. Press the HOME button once. Ensure that the blade arm moves to its full up and back position.
18. Press the START/STOP button. Ensure that the blade arm steps down, begins oscillating and moving forward, and that the slice counter increments by 1.
19. Allow the blade arm to travel to its forward mechanical limit. At that point the blade should stop oscillating and return to the reverse limit. Ensure that at the reverse limit, the blade arm stops, steps down, then begins oscillating and moving forward. Ensure that the slice counter increments by 1.
20. While the arm is still moving, press the START/STOP button. Ensure that all movement has stopped.

21. Press the START/STOP button again. Ensure that the blade arm returns to its reverse limit, stops, steps down, and begins oscillating and moving forward.
22. Press the START/STOP button to stop movement when the blade is approximately  $\frac{1}{4}$  of its travel.
23. Press the REVERSE LIMIT button to set the rear slice window limit.
24. Press the FORWARD button and allow the blade to travel to approximately  $\frac{3}{4}$  of its travel. Press the FORWARD button again to stop movement.
25. Press the FORWARD LIMIT button to set the forward slice window limit.
26. Press the START/STOP button. Ensure that the blade travels back to the set rear slice window limit that was set, step down (counter increments by one), and begin oscillating and moving forward. When it reaches the set forward slice window limit, ensure that the unit stops and returns to the reverse limit where it cycles again.
27. Press the START/STOP button to stop the cycle. Using the FORWARD and REVERSE buttons to position, set a new travel window using the FORWARD LIMIT and REVERSE LIMIT buttons.
28. Press the START/STOP button and ensure that the unit cycles in the new set window. Press again to stop the cycle.
29. Press the HOME button to return the unit to its full up and back position.

### ***Slice Test:***

Below is a test to determine integrity of the blade arm movement. It can also be used to determine the correct oscillation and advance speed settings without using specimen tissue.

1. Cut a block of hard boiled egg white approx. 1.5cmX1.5cmX1.5cm
2. Glue the block to the center of the platform surface (cyanoacrylate works fine in this application). Alternately, attach the egg to a mounting block if using the vise/block arrangement.
3. Install the platform or vise/block into the tray. Fill the tray with cold water.
4. Install the tray onto the unit.
5. Install a new blade into the blade holder set the angle to 25°.
6. Position the blade to a point behind the egg block. Press the REVERSE LIMIT button to set the rear slice window limit.
7. Position the blade using the DOWN button to a point just above the egg block.
8. Press the FORWARD button and allow the blade to travel over the egg block.
9. When the blade has cleared the block, press the FORWARD button again to stop movement.
10. Press the FORWARD LIMIT button to set the forward slice window limit.
11. Set the thickness to 100 microns.
12. Set the oscillation and advance speeds to a low number (10 is a good starting point)
13. Press the START/STOP button and allow the unit to cycle through until it makes uniform slices of the egg block. Press START/STOP button to stop movement.
14. Set the thickness to 30 microns.
15. Cycle the unit until uniform slices are achieved. The oscillation and advance speeds may need to be changed if the slice integrity is not good.
16. Once the 30 micron slices are achieved, set the thickness to 20 microns and repeat until the slices are uniform. Again the correct oscillation and advance settings need to be determined empirically. A general rule is that the oscillation and advance need to be slow if thin (40micron or less) slices are desired.

## **2.4 OPERATIONAL INFORMATION**

The OTS-5000 can be operated in two modes. In manual slice mode, the operator may make a slice and harvest it while the blade arm repositions itself for the next slice. In multiple slice mode, the operator may program the OTS-5000 to automatically slice the specimen block into multiple uniform slices. Single slices can also be performed in multiple slice mode by using the start/stop button.

### **Initial Setup:**

1. Ensure that the unit is installed correctly per section 2.2
2. Activate power using switch on the back panel. (Indicated by the I side of the rocker switch pressed in.)
3. Press the HOME button to ensure that the blade arm is in the maximum up and back position. If it is already in the home position, no movement will occur.
4. Remove the tray from the unit. To remove the tray; loosen the two thumbscrews on both sides of the bottom of the tray. Slide the tray forward off of the base.
5. Remove the pedestal from the tray. The pedestal can be removed by loosening the post thumbscrew a half turn. Grasp the thumbscrew and pivot pin and lift the pedestal straight up. Alternately, remove the vise in the same manner if using the vise/mounting block arrangement.
6. Prepare a volume of Ringers or other medium oxygenated with 95% O. Put a small amount in a beaker immersed in an ice bath.
7. Secure a new blade in the blade holder and tighten securely. Cleaning the blade with acetone or alcohol is suggested to remove any grease or oil.
8. To set the blade angle; loosen the black Allen screw on the blade arm. Reference marks on the side of the blade head are provided at 15,25, and 35 degrees. Once the angle is set, re-tighten the Allen screw to secure. The correct blade angle will vary depending on blade dimension, sample type, and desired slice thickness. The angle should be set so that the slice "peels" up and over during the slice process.
9. Prepare the surface of the sample pedestal or mounting block by scraping with a previously used slicer blade followed by a light sanding with fine emery paper; clean with alcohol and blot absolutely dry.
10. Rapidly excise the tissue and cut the structure of interest into a block leaving a minimum of excess tissue, especially connective tissue. During the trimming process, bathe the tissue continuously with an eyedropper filled with the cooled medium.
11. Turn the side of the tissue to be bonded up, and gently blot as dry as possible. Place a thin layer of tissue adhesive on the pedestal; too thick a layer of adhesive will ride up along the sides of the tissue and interfere with the slicing. Immediately position the dry side of the sample on the adhesive and ensure a solid bond is created.
12. Position the pedestal in the tray and set the sample angle if desired. To set the sample angle; use the pivot pins on the side (y axis) and front (x axis) to set the angle, then secure the pedestal by tightening the thumbscrew. Alternately, secure the mounting block in the vise, and position the setup in the tray.
13. Immediately fill the tray with cooled medium. Ensure that the sample is covered by one or two millimeters.
14. Slide the tray onto the mount and tighten the two thumbscrews to secure.
15. Set the ADVANCE speed to a high setting (15-20) using the appropriate keypad buttons.
16. Using the BLADE POSITION buttons, position the blade to an initial slicing position just behind and above the sample.
17. Set the OSCILLATION and ADVANCE speed using the appropriate keypad buttons.



18. Set the slice thickness for the initial slice using the appropriate keypad buttons. In order to initially prepare the sample, it is suggested that the first slices are relatively thick (50 microns and up).
19. Press the FORWARD button once to initiate slicing, Once the blade has cleared the sample, press the FORWARD button again to stop.
20. Press the REVERSE button to reposition the blade behind the slice. When the blade is in a convenient position, press the REVERSE button again to stop movement.
21. Press the DOWN button once to move the blade arm down at the chosen thickness setting.
22. It may be necessary to perform multiple slices to initially prepare the sample. Once a consistent slice is achieved, usable sample slices can be performed by one of the following slice modes.

### **Manual Slice Mode:**

1. Position the blade at a convenient spot behind the slice.
1. Press the ZERO button to set the slice counter to zero if desired.
2. Set the slice THICKNESS using the appropriate keypad buttons.
3. Set the OSCILLATION and ADVANCE speeds to an appropriate setting. Due to differences in blade and sample type, these settings will be obtained empirically. Generally, the thinner the slice, the slower the speeds.
4. Press the FORWARD button once to begin slicing.
5. Once the blade has cleared the sample, press the FORWARD button once to stop movement. If allowed to continue, the blade will advance to its forward mechanical limit then stop and wait for a command.
6. Press the REVERSE button once to move the blade back. Harvesting the slice can be performed if desired.
7. Once the blade has cleared the slice, press the REVERSE button once to stop movement. If allowed to continue, the blade will return to its reverse mechanical limit, then stop and wait for a command.
8. Press the DOWN button once to lower the blade arm the set thickness amount.
9. Repeat steps 4 – 8 to repeat slicing.
10. To return the blade arm to its furthest up and back position, press the appropriate BLADE POSITION button to stop movement if in motion (FORWARD if blade arm is advancing, REVERSE if returning) then press the HOME button.
11. To check or change the slice thickness setting at any time, press either of the THICKNESS buttons once. The display will show the current slice thickness in microns. Pressing either again will change the slice thickness. The new setting will take effect the next time the DOWN button is pressed. 5 seconds of inactivity will cause the display to revert to the slice count mode.
12. The foot pedal may be used in manual slice mode to take the place of the FORWARD blade position button on the keypad. (These are disabled while the pedal is installed. See sec. 2.2 for instructions on installing the foot pedal.) Pressing the foot pedal causes the blade to oscillate and move forward. Letting up will cause the blade to return to the reverse limit and stop. (If blade reaches its forward mechanical limit, it will automatically return.)

### **Multiple Slice Mode:**

**To set the TRAVEL WINDOW:** (Optional. The travel window can be used to reduce the operating range to save time. If the travel window is not used, the forward and reverse mechanical limits define the travel window.)

1. Position the blade at a convenient spot behind the sample.
2. Press the REVERSE LIMIT button if not previously set during initial setup. During operation the blade will return to this point when slice is complete.
3. Press the FORWARD button once to begin slicing.
4. Once the blade has cleared the sample, press the FORWARD button once to stop movement. If allowed to continue, the blade will advance to its forward mechanical limit, then return to the reverse limit and wait for a command.
5. Press the FORWARD LIMIT button if not previously set during initial setup. During operation, the blade will automatically return to the reverse limit from this point.
6. To change the Forward or Reverse limits at any time during operation, press the START/STOP button once to stop movement. Reposition the blade arm using the appropriate keypad buttons. Repeat steps 2-5 to set the new slice window.
7. Once both limits are set, the unit is ready to automatically slice multiple slices.

#### **To begin slicing:**

1. Press the ZERO button to set the slice counter to zero if desired.
2. Press the START/STOP button once. The blade will oscillate and move forward until it reaches the set forward limit (or mechanical), stop, then return to the reverse limit.
3. When the reverse limit is reached, the blade arm will stop, step down the set thickness amount, and move forward for another slice.
4. The unit will continue automatically slicing, until the lowest mechanical limit is reached, or the START/STOP button is pressed. Due to the variance in blade angle settings, it is possible for the blade to run into the pedestal or mounting block surface before reaching the lowest mechanical limit.
5. The START/STOP button can be used to perform single slices. Pressing the START/STOP button once will stop movement of the blade arm if in motion. If not in motion, pressing the START/STOP button will cause the blade arm to move to the reverse limit, either mechanical or set, step down the set thickness amount, then begin slicing.
6. To check the slice thickness at any time, press either of the THICKNESS buttons once. The display will show the current slice thickness setting in microns. 5 seconds of inactivity will cause the display to revert to the slice count mode.
7. To change the thickness setting, press the START/STOP button once to stop movement if in motion. Change the setting using the appropriate keypad buttons, then press the START/STOP button again. The blade arm will return to its reverse limit, step down the new thickness amount, and begin slicing.
8. Pressing the HOME button at any time will return the blade arm to its furthest up and back position.

#### **Foot Pedal Operation**

1. Turn the power switch off if applicable
2. Ensure that the foot pedal is installed correctly per section 2.2.
3. Activate power using switch on the back panel. (Indicated by the I side of the rocker switch pressed in.)
4. Press the START/STOP button to activate multiple slice mode. (The foot pedal needs to be in this mode to function correctly.)
5. The foot pedal is used in place of the FORWARD keypad button in multiple slice mode above.

6. Pressing the foot pedal down begins blade arm advance and oscillation. Lifting off stops all movement.

## **2.5 SCHEDULED MAINTENANCE**

The surfaces of the OTS5000 can be cleaned of any salt buildup etc. by washing with soap and water. DO NOT use phenol or ketones to clean.

A yearly performance of the Functional Checkout in section 2.3 should be performed to ensure function and calibration. If the unit fails any part of this functional test, contact the FHC Repair Department at (207)666-8190