"Innovation through collaboration"

FHC

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

OTS-3000-05 TISSUE SLICER

80-10-8-05

microTargeting™

neurocraft™

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OTS-3000-05 TISSUE SLICER

A960C-01

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LINEAR CUTTING BLADE MOTION TO 3000 CYCLES PER MINUTE

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MOTORIZED VARIABLE SPEED SPECIMEN ADVANCE; MOMENTARY OR CONTINUOUS MODES

PURE WHITE, HIGH INTENSITY HALOGEN LAMP WITH FIBER OPTIC TRANSMITTING TUBE GIVES PRECISE ILLUMINATION WITH MINIMAL HEAT

X2 MAGNIFYING LENS (4" D) INCLUDED

1.2 DESCRIPTION

The development of advanced cellular histochemical techniques as well as isolated slice microelectrode recording methods has generated a need for a suitable tissue slicer to permit the investigator to realize the potential from these valuable techniques.

We believe our new OTS-3000-05 Tissue Slicer represents the most thoughtfully designed, reasonably priced solution to preparing slices as thin as 50 microns from unfrozen tissue. For maximum precision, it features thumbwheel selection of slice thickness including motorized control of the blade height and digital display of the total cutting excursion.

The blade motion is linear with a wide range of adjustable speeds. Specimen advance through the blade is motorized at an adjustable rate; the tray can be moved in a continuous manner or by momentary advance when the "spring-back" toggle is depressed.

The OTS-3000-05 is designed for easy operation and maintenance. All controls can be set with one hand; the blade oscillation may be activated with a foot switch freeing the other hand to manipulate the specimen. The media tray is removable for easy cleaning; no solutions come in contact with the mechanical advance mechanisms.

Maximum access and visibility are provided. The instrument includes an easily "aimed" magnifier and high intensity halogen lamp which bathes the specimen in "white light" for natural color rendition; the light is transmitted to the sample with a fiber optic tube with focusing lens.

The Slicer occupies only a square foot of bench top space. It is built to give many years of precision service; all moving surfaces are stainless steel ball slides. The OTS-3000 can be line powered from 115 or 230V, 50-60Hz mains.

1.3 TECHNICAL SUMMARY

1.3.1 SPECIFICATIONS

Blade height adjustment: 25mm total travel adjustable in 10 micron increments set on digital thumbwheel switches.

Slice thickness: adjustable from 10 to 990 microns in 10 micron increments

Blade speed: continuously adjustable from 100 - 3000 cycles per minute

Blade motion: linear, 1.2mm traverse (other ranges, optional)

Blade angle adjustment: adjustable from 10 to 30 degrees with 5 degree increments indicated

Specimen advance, travel: 25mm total

Specimen advance, forward speed: continuously adjustable from .1 - 1.0mm per second; **reverse speed:** 1.2mm per second

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

Lamp: 20 watt halogen white lamp with fiber optic tube and focusing lens

Magnifier: 4" (10cm) diameter, X2 lens mounted on 12" (30cm) gooseneck, 9" working distance

Dimensions: 11 1/2"w x 11"d x 10"h (29 x 28 x 13cm), 18lb. (8kg)

Power requirements: 115/230VAC, switch selectable, 50-60Hz, fused at 1Amp max current

1.3.2 CONTROLS / CONNECTORS

CONTROLS -- FRONT PANEL

Tray advance - direction: 3-position toggle switch (center off) for selecting MOM (momentary) advance (up) or return (down) tray motion.

Tray advance, mode: 3-position toggle switch (center off) for selecting continuous advance (up) at the selected rate or continuous return at the maximum rate.

Tray advance, rate: 1-turn potentiometer with calibrated dial for selecting rate of tray advance (tray return rate is always 1.2mm per second)

Blade height, direction: 2-position toggle switch for selecting up or down motion

Blade height, mode: 2-position switch for selecting continuous steps or single steps

Blade height, step: pushbutton switch for initiating single step equal to slice thickness selected on thumbwheel switches

Blade height reference: Pushbutton switch to zero the 5-digit LED display

Slice thickness: 2-digit thumbwheel switches for selecting slice thickness in 10 micron increments (least significant digit on 3-digit bank is fixed at 0)

Blade speed: 1-turn potentiometer with calibrated dial for selecting blade speed

Blade motion: 2-position toggle switch for selecting motion continuously on or activated through Foot Switch on 6 ft (2m) cord

Lamp: 2-position toggle switch (located on top of cabinet for activating halogen lamp (power switch must also be activated)

CONTROLS -- REAR PANEL

Power: 2-position rocker switch for activating line voltage

Voltage: 2-position slide switch for selecting 115 or 230V line voltage

CONNECTORS -- REAR PANEL

Fuse: Holder for 1A SLO-BLO fuse

Line: 6 ft. line cord with three pronged plug

Foot Switch: 1/4" phone jack for Foot Switch cable connector

1.3.3 OPTIONS / COMPATIBILITY

1.4 INVENTORY CHECK

1.4.1 INCLUDED ITEMS

Your OTS-3000 is provided with the following items which may be wrapped separately in packaging:

Instruction Bulletin A960C-01
OTS-3000 cabinet
Footswitch with 6' cable
Fiber optic tube with focusing lens
Slicer blades, Pk25
4" magnifying lens with gooseneck
3 1/2" wide Tray with pedestal
Adjustable pedestal
Fixed stage pedestal

1.4.2 REPLACEMENT/ACCESSORY ITEMS

E3-45-02	20W Halogen Bulb
80-12-3-02	Pedestal Surface (2 7/8") Delrin
80-11-6	Slice Blades Pk/25

Note: all other OTS-3000 components as detailed in the assembly drawings in section 3 are available by contacting our sales department.

80-12-1	Glass Blade Holder
80-12-2-02	Vise Assembly (2 7/8")
80-12-1	Mounting Blocks, Pk/3
80-10-9	Refrigeration System

1.5 ILLUSTRATIVE EXAMPLE

The procedure below illustrates slicing fresh brain tissue for electrophysiological recording.

1. Activate power and position the blade in the maximum UP and tray advance in the maximum RETURN position.

2. Prepare the surface of the sample pedestal by scraping with a previously used slicer blade followed by a light sanding with fine emery paper; clean with alcohol and blot absolutely dry.

3. Prepare a volume of Ringers or other media oxygenated with 95% O_2/5% CO_2. Put a small amount in a beaker immersed in an ice bath.

4. Position a new slicer blade in the blade arm slot and tighten securely. Clean both sides of the blade with soft tissue soaked in acetone or alcohol to remove any grease or oil.

5. Fill the tray and fill with oxygenated media. If the refrigeration unit is used, connect the inlet port to a suitable tap water supply.

6. 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 eye dropper filled with the cooled media. 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.

K3-11

Position the pedestal in the tray, being certain that the tissue is covered by a millimeter or two of media.

7. Set the slice thickness thumbwheels to 010 (10 microns), the blade height direction switch DOWN and the mode switch to CONTINUOUS. This will cause the blade to begin a slow descent. Switch the mode to STEP when the blade approaches the correct height for a preliminary slice through the top of the tissue block.

Set the auto section to manual, the tray advance to ADVANCE and the rate vernier to 2. Depress the mode switch to MOM, to cause the tray to advance towards the tissue.

Activate the halogen lamp and position the magnifier as the blade and tissue are brought closer.

8. The correct tray advance and blade speed rates are determined by the temperature and consistency of the specimen as well as the slice thickness required. When beginning a new preparation, it is important to make several test passes to determine the optimum rate for the tissue under the experimental conditions.

Set the blade speed vernier to about 2 and depress the foot switch to cause the blade to oscillate. The momentary tray advance mode is useful; if the tissue begins to bundle up, the advance can be quickly stopped allowing the tissue to recover.

9. After the first cut, return the tray to a point in front of the tissue block. Set the thumbwheels to the required slice thickness, e.g. 300 microns. Zero the display counters by depressing the reference pushbutton. Push the STEP pushbutton which will cause the blade to move downward by the selected step thickness.

10. Activate the foot switch and advance the tray. The slice may float off the blade or remain adhered to it. Use a 000 sable brush or a small piece of filter paper to remove the slice; store it in a small beaker of cooled media until all slices are prepared.

11. Return the tray to a position with the blade in front of the block, depress the blade height pushbutton to position the blade for the next slice and begin another sequence by setting the tray direction to advance.

12. When all slices are prepared, return the tray to the maximum RETURN position and the blade height to the maximum UP position. Turn off the halogen lamp and swing the magnifying lens to the right.

Remove the blade from the blade holder and wipe dry with a soft tissue. Save the blade for clean up of the pedestal or the gross trimming of the tissue, but do not reuse blades when preparing slices. Thoroughly rinse the tray with tap water followed by a distilled water rinse. It is not advisable to wash the tray using a detergent or acid wash as contaminants may remain and interfere with future experiments.

2 REFERENCE MANUAL

2.1 REFERENCE INFORMATION

2.1.3 INSPECTION

FHC modules are factory checked and calibrated but should be carefully inspected before activating power.

If any exterior damage to the shipping carton is noted, the bottom panel should be removed (refer to Section 3.1) and the interior of the instrument inspected for obvious physical damage.

2.1.4 POWER CONNECTIONS

If the module is powered from line voltage, before plugging the connector into the receptacle, set the line voltage switch on the back panel to the correct setting. It is also important to be certain that the receptacle into which the unit is plugged is properly grounded. See SPECIFICATIONS for line fuse amperage.

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.

Even though 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. UPGRADES: Our unique upgrade policies insure against obsolescence and provide that once you are a customer, you will have our new technology available to you.

   Upgrades for existing hardware systems are offered at FHC's cost; software upgrades are provided free of charge.

3. OPTIONS: Newly developed Options will be available to current users at reduced prices. Any necessary hardware will be offered at 25% off the list price. Software, if ordered prior to the formal release of the product will be 50% off the list price. Software ordered after final release will be offered at 25% off the list price.

4. 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 return instructions (207-729-1601). 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. 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

2.2.1 INITITAL ASSEMBLY

Set the OTS-3000 cabinet on a solid, level bench top.

Insert the large fitting at the end of the fiber optic light pipe into the lamp mount on the cabinet back panel and secure with the thumbscrew; the focusing lens slips over the ferule end and is adjustable by moving it up and down in the ferule.

The magnifying lens gooseneck slips over the mounting stud on the top of the cabinet.

Insert the foot switch cable connector into the socket on the cabinet back panel.

2.2.2 MOUNTING/REMOVING TRAY

The OTS-3000 specimen tray includes a lock-on slot to more solidly mount it to the platform while still allowing some adjustment in the positioning of the tray relative to the blade.

To mount the tray on the slide, hold one of thumbscrews on the side of slide and tilting the tray under the blade arm, slide it forward until the thumbscrew threads slide into the slots on the side of the tray.

Since the tray drive is spring loaded, it may be dislodged during the tray mounting operation. This will result in a momentary discontinuity when the tray drive is activated. However, the mechanism will re-seat automatically.

The sample mounting options for the OTS-3000 tray system includes provision for changing the angle relative to the blade oscillation.

The unit is provided with two Pedestal systems, which mount in round grooves in the sample tray side wall. The Fixed stage pedestal is removed by loosening the thumbscrew about half a turn, and lifting up. To remove the Adjustible pedestal from the tray loosen the thumbscrew on the top of the post about half a turn and, grasping the thumbscrew and the pivot pin, lift the assembly vertically out of the slots as shown below.

After mounting the sample reverse the above operation. Use the pivot pin to set the angle of the sample relative to the blade. A gentle tightening of the thumbscrew is all that is required to securely hold the assembly in position.

DRAWING: K3-41 (A&B)

2.2.3 LIGHT BULB REPLACEMENT

Remove the fiber optic pipe from the lamp mount (on the cabinet back panel) by loosening the thumbscrew.

Remove the lamp mount housing by unscrewing the two screws (one on each side of the housing). Gently, pull the housing forward exposing the back of the bulb. Work off the connector. The bulb is held in position by an O-ring which can be removed using forceps.

NOTE: NEVER handle high intensity lamps in such a way as to touch the front lens leaving oils on its surface. This dramatically reduces bulb life!

Replace the bulb (please refer to section 1.4.2 for Bulb #). Position the housing back in the cabinet and screw in the two mounting screws. Replace the fiber optic pipe and secure with thumbscrew.

2.3 BLADE HOLDER INFORMATION

Your OTS-3000 Blade holder is provided with a clamp type holder; loosening the thumbscrew will allow various sized blades to be mounted between the top clamp and base plate. The diagram below shows the external positions of the blade arm relative to the tray. Please note that if blades of size other than those provided with your unit are used, they may change the relative position of the blade to sample.

Figure K3-39

2.5 OPERATIONAL INFORMATION

The OTS-3000 Slicer's cutting action avoids the traumatic damage often found with some alternative methods (Garthwaite et al., 1979). Reviews of methods for uses of tissue in physiological neurosciences are found in Andersen (1981), Dingledine et al. (1980) and in various papers in Brain Research Bulletin, 5 (1980).

It is best to use a new blade for each brain or specimen. After positioning in the blade holder, the blade should be cleaned with a solvent like acetone.

Dissection, trimming and gluing should be performed quickly so that the tissue is immersed in freshly oxygenated saline as soon as possible to minimize anoxic damage. However, total failures are more often due to clumsy handling than to anoxia - so speed should not be substituted for care.

The block of tissue must be fixed firmly to the pedestal. We use cyanoacrylate adhesive and apply it to the pedestal just before sacrificing the animal. If too much glue has been applied, it may spread up the sides of the specimen forming a rigid sheet which interferes with cutting.

Slices are cut under saline, Ringers, or CSF to a) oxygenate the tissue and b) to lubricate the blade as it cuts. The tissue should be covered to a depth of a few millimeters; much more results in reduced visibility during slicing due to the ripples set up by the vibrating blade. Tissue can be cut at room temperature but cooled media increases tissue consistency as well as tissue viability.

There are two controls over cutting: the frequency of the oscillating blade and the rate of advance of tissue across the blade. A third possible variable, the traverse of the blade oscillating has been set by an eccentric cam to 1.2mm which has proved suitable for most live and frozen tissue applications. Other cams are available.

Faster oscillation is good for fresh slices more than 200 microns thick. Thinner slices may benefit from slower oscillation. The rate of tissue advance is most important. It should be relatively slow (several seconds for each mm of travel). If it is too fast, the blade tends to push the tissue over rather than cut cleanly through it. What is meant by "too fast" depends on the local consistency of the tissue; it tends to be slower in tougher materials such as dense connective tissue. It may be necessary to stop the advance for a few seconds before resuming

the cut. The MOM (Momentary) Tray Advance Switch position is useful since it allows the advance to be started and stopped if the tissue "bundles up".

If the blade does not cut cleanly, but instead deforms the tissue, several possibilities should be considered, in addition to a slower advance. The simplest solution is often to use a smaller (lower) block of tissue so that cuts are made closer to the glued surface. Extra support can be obtained by leaving adjacent tissue attached to the sliced structure or embedding it in a suitable material such as agar. Connective tissue on the trailing edge of a tissue specimen is often troublesome and usually can be avoided by gluing the tissue in another orientation or by careful trimming.

Deciding on a thickness for fresh tissue slices is a compromise between preservation of anatomical integrity (better in thicker slices) and access for metabolites, especially oxygen (better in thinner slices). There are several theoretical and experimental accounts of the thickest slice with a metabolically viable center (e.g., Warburg, 1930; Elliot, 1969; Harvey, Schofield & Brown, 1974). Generally, 400 micron slices equilibrated with 95% O_2 - 5% CO_2 at 32 or 37°C are adequate for experiments on hippocampus and cerebellum. If thicker slices are essential it may help to reduce temperature (which slows metabolism) or to try a smaller experimental animal. Slices up to 750 microns have been described in the literature (Halliwell, 1975). If direct visualization of individual neurons is required, use very thin (70-100 microns) slices (Yamamoto & Chuju, 1978). The limited penetration of some histological reagents into tissue make it necessary to cut the fixed tissue into thinner blocks. For example, 100 micron slices for processing horseradish perioxidase filled neurons.

Slices can be transferred as they are cut or allowed to accumulate on the blade until the end of the run. A 000 sable brush is recommended for transfer to the recording or holding chamber.

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3 TECHNICAL MANUAL

3.0 GENERAL DOCUMENTATION INFORMATION

It is our policy to provide comprehensive product documentation with our instruments. Section 3 of our instruction information includes not only technical descriptions and calibration procedures but parts lists, schematics and parts layouts. We also maintain a service record file on each product, information of which is available to any instrument owner if in the future he should experience problems.

Section 3.4 includes our master parts list which details the asemblies for the instrument and individual parts list for each assembly. These parts lists include our FHC part or assembly numbers, a general description of the part, and quantities.

Parts layouts are provided for all relevant assemblies. These layouts include component values and circuit numbers unique to the assembly. In those cases where the density of the assembly is too high a separate drawing with circuit numbers is included.

Complete schematics are also provided for each instrument. Schematics include all components of an instrument and as such, one schematic may include two or more assemblies, e.g. front panel and captive circuit board assemblies. Whenever possible assemblies are separated or designated on schematics. Schematics, in addition to listing component values include circuit numbers. Because circuit numbers are unique to each assembly, the same circuit number e.g C10 may be used twice on a schematic referring in one place to a 10 pF capacitor on a front panel switch and in another to a .47mF PCB mounted capacitor. However, functional considerations should remove any ambiguity.

Schematics are referenced by the instrument catalog number followed by a code which lists the total number of pages which constitute the complete instrument schematic i.e. 1/2, 2/2.

Assemblies are referenced by the assembly number followed by the number of pages code. In those situations in which a printed circuit board is wired to another assembly, for example a front panel, the identifying interconnections, wire colors, etc. are included with the front panel assembly.

3.1 SPECIFIC PACKAGING DISASSEMBLY INFORMATION

3.1 Disassembly for service or calibration

Access to the circuitry and most of the mechanics of the OTS-3000 Tissue Slicer is through the bottom panel.

To service or calibrate the instrument:

1. Disconnect (unplug) the power from the mains. It is NOT sufficient to simply turn off power with the front panel switch.

2. Remove the magnifier gooseneck and fiber optic light pipe.

3. Set the instrument on its left side (as facing it).

4. Remove the four screws near each corner holding the bottom panel to the chassis. Note that these screws are towards the center compared to another set of four screws which hold the end panels to the top panel. Do NOT remove these four end panel screws.

5. Lay the bottom panel on the table. Note two circuit cards mounted on the bottom panel.

To remove a circuit card, remove the four screws (one at each corner) holding it to the bottom panel standoffs and unplug the connectors. Assembly drawings 1188 and 1043 indicate the orientation and location of these connectors when replacing the printed circuit card.

3.2 TECHNICAL DESCRIPTION

Technical Description

Referring to Schematic 1/3, the vertical displacement of the blade mechanism is controlled by stepper motor driving a screw such that each step results in a 10 micron movement of the blade. IC v is an oscillator that generates the pulses that ultimately drive the stepper motor. In the STEP mode, IC's b and c count these pulses up to the number set on the front panel SLICE THICKNESS thumbwheel switches each time the STEP pusbutton is depressed. In the CONT mode, these counters are bypassed and a steady stream of pulses is gated to IC's W and X which generate the quadrature signal required to step the motor. IC's C-G count the pulses driving the motor. The outputs of these counters go to IC's N-Q (shown on schematic 2/3), which, with IC's T and M, generate a multiplexed signal to drive the 5 digit, 7 segment LED display which shows blade displacement in microns.

Schematic 3/3 shows the slicer power supply and the circuitry for driving the blade and tray motors. Op-amp IC B buffers the voltage from the BLADE SPEED potentiometer, and through Q3 drives the motor which oscillates the blade.

The tray drive motor is driven in a similar manner by ICn and Q5.

3.3 CALIBRATION PROCEDURE

Please refer to Assembly Drawing 1185C1.xx

1. ALIGNING TRAY DRIVE SHAFT ASSEMBLY (16)

NOTE: The manufacturer installs all cap screws in mechanical assembly using a silicone sealant to inhibit loosening due to vibration. If retightening is necessary, remove screw and apply a small amount of sealant to threads before reassembly. See Section 3.1 for disassembly.

a. Use a try square to ensure that the Tray Drive Motor Mount (3) is perpendicular to the bottom edge of the assembly base.

b. Grasp Tray Drive Motor (25), and attempt to turn slightly. If motor turns, the three 4-40 screws in the Tray Drive Motor Mount (3) need to be tightened. Turn motor so that Drive Shaft (16) is centered in hole in the Tray Drive Coupling (5), tighten motor mount screws securely. Check that Drive Shaft is secured to shaft of Tray Drive Motor (25). Tighten setscrew at base of drive shaft as needed, using hex key provided.

c. With tray motor running slowly in advance, verify that the drive shaft is turning concentrically, i.e., there is no side to side movement at end of shaft.

d. If sideways movement is noted, switch to momentary advance and, using the slot in the bottom of the Assembly Base (1) for visual reference, rotate drive shaft to apogee (max sideways position).

e. With a straight slot screwdriver inserted between assembly base and Drive Shaft, gently lever downwards on drive shaft until it is aligned with slot in Assembly Base. Repeat steps d. and e. until drive shaft turns concentrically. Retighten setscrew on drive shaft. Recheck that drive shaft is centered in Tray Drive Coupling and no binding occurs throughout advance and return. Readjust motor mounting plate screws as necessary.

f. Unplug unit and reinstall bottom panel.

2. ALIGNING THE BLADE HOLDER (14)

a. Turn the tray around backwards from its normal orientation and position it on the the X-Slide so that the back edge of the tray is under the Blade Holder.

b. Using the Tray Advance and Blade Height controls, position the tray and orient the Blade Holder so that the front edge of the holder is just below the back edge of the tray. Advance the tray drive slowly so that the edge of the blade holder is very close to the back of the tray. Verify that the edge is parallel to the back of the tray.

c. If the edge of the holder is parallel, proceed to 3 below. If it is not, loosen the two flat head screws (B on assembly 1185c1.xx drawing) which secure the holder to the Blade Carrier (46) and reposition it to parallel.

NOTE: It is good practice to install all screws that are subject to vibration using a small amount of silcone sealant on the threads. If any screws are loosened during these alignment procedures, the sealant should be replaced.

3. ALIGNING THE Y-SLIDE (10)

a. Using the Blade Height controls, raise the blade arm to its maximum up position; leave the tray positioned backwards on the X-Slide.

Clamp a blade in the holder.

b. Using Tray Advance controls, position the black end of the tray directly underneath the blade.

c. Step blade down, checking that it is parallel to top as it approaches the tray. The blade should contact the top of the tray uniformly.

d. If blade is not parallel, slightly loosen the two cap screws (A) that hold the Y-slide in position; lift up on blade arm assembly to access lower screw. Adjust the Y-slide until blade is parallel to tray. Tighten upper cap screw. Re-check the alignment, then lift the blade arm and securely tighten lower Y-slide screw.

Repeat step c to verify alignment.

4. PARALLELING BLADE TO TRAY ASSEMBLY - VERTICAL PLANE

a. Return tray assembly so that blade assembly can drop below the top edge of tray assembly. Lower blade slightly.

b. Slowly advance tray assembly until back wall of tray assembly is almost touching the blade.

c. Check to see that blade is parallel to back of tray.

d. If blade is not parallel to tray, check to see if blade is properly seated in blade clamp.

e. If blade is still not parallel to back of tray, remove blade and check to see if the two parts of the blade clamping devise are fastened tightly together and tightly against the delrin piece.

f. If blade is still not parallel, loosen two cap screws that hold Z-slide in position. (Lift up on blade arm assembly to access lower screw). Rotate Z-slide until blade is parallel to tray. Tighten upper cap screw. Recheck alignment, then lift blade arm and securely tighten lower Z-slide screw.

f. Check that pedestal is parallel to blade.

g. Remove tray. Secure pedestal in tray. Turn tray around to correct position and replace on X-slide. Run blade down inside tray and check that blade is also parallel with pedestal.

5. CHECKING ACCURACY OF SLICE (STEP) THICKNESS

a. Lower the blade arm assembly to about the midpoint of it's travel range.

b. Set up a dial gauge to measure the vertical movement of either the blade arm assembly or the Y slide of the tissue slicer.

c. Set the slice (step) thickness to 250 microns (equal to approximately 0.01 inches), and, using the dial gauge, measure the vertical movement of the blade assembly arm as it is lowered by pressing the step button. In actual usage, the blade's cutting oscillations will seat the Y-slide as it steps up and down. During this procedure,

however, the blade is not moving. It may be necessary to tap the top of the blade arm assembly lightly with a finger to ensure positive measurements.

d. Step the blade arm assembly down through the entire range of the dial gauge, checking that each step measures 0.010 +/- 0.0005 inches on the dial gauge.

e. Reset the dial gauge near the lower limit of travel

of the blade arm assembly, and repeat step (d).

f. If step travel is not within limits mentioned above, check the Y slide for smooth and unimpeded movement, and check the alignment of the drive screw.

6. MOTOR SPEED ADJUSTMENTS

Trimpots to adjust the blade and tray drive speeds are located on a printed circuit board accessible by removing the bottom panel of the instrument. Refer to Dwg. 1188B1.00.

a. Tray Advance Calibration

With tray advance rate knob turned fully counter clockwise, adjust trim pot #2 so that tray is moving slowly but with just enough speed to turn off the limit switch in the full advance position. If limit switch is not turned off, the hum of the motor can still be heard when the tray is in the full advance position.

b. Blade Speed Calibration

Minimum Speed

Turn blade speed knob counter clockwise (reading 0). Connect voltmeter across motor terminals (at motor). Adjust trim pot #1 until meter reads approximately 1.0V DC.

This should correspond to a rate of approximately 180 oscillations per minute (3/sec).

Maximum speed

Turn blade speed knob clockwise to a reading of 10. Connect voltmeter across motor terminals (at motor). Adjust trim pot #3 until meter reads 4.8V DC.

7. CLEANING VERTICAL DRIVE SHAFT

NOTE: The manufacturer installs all cap screws in mechanical assembly using a silicone sealant to inhibit loosening due to vibration. If retightening is necessary, remove screw and apply a small amount of sealant to threads before reassembly.

a. See Section 3.1 for disassembly.

b. Remove (2) 6-32 x 1/2" capscrews securing blade height motor to mechanical assembly. Push ground lug and wire aside, and slide motor assembly straight out and away from slicer, being careful not to knock or otherwise misalign drive shaft on motor. Note slightly enlongated holes on motor base.

c. Using a lint free cloth, carefully remove all grease and dust from drive shaft and drive nut. Reach inside slicer mechanical assembly and remove grease from blade height coupling. Apply a small amount of lithium grease (or equivalent) to shaft threads and top of nut.

d. Slide motor and drive shaft assembly onto mechanical assembly, again taking care not to misalign drive shaft. Drive nut should seat inside blade height coupling. Replace capscrews and ground wire, but do not tighten securely. Manually move Blade Arm assembly up and down, checking for any rubbing of drive threads on Blade height coupling, and that drive nut seats easily inside coupling. If rubbing is evident, use slotted holes in motor base to slide motor back and forth until drive shaft is centered on blade height coupling. Tighten capscrews securely.

e. Replace bottom panel and apply power to unit. Using front panel switches, check for smooth travel of Blade Arm from upper to lower limits. A chattering during travel would suggest that the Drive Nut is not seating properly in the Blade Height Coupling. Manually raising the Blade Arm (while motor is turning), and then lowering Blade Arm until nut seats in coupling will allow for a centering of nut within Blade Height Coupling.

f. See Section 3.3.5 to check accuracy of slice thickness.

g. If slice thickness is still out of specifications, recalibration of Vertical Drive Screw is necessary. It is recommended that unit be returned to manufacturer for calibration.

8. Aligning the Blade Height motor

a.. Carefully align the bracket so that it is exactly parallel with the side of the slide; tighten its two mounting screws securely. It is critical that this bracket be mounted aligned with the side of the slide! Otherwise, the limit switches may be damaged.

b. Loosen the two screws holding the motor to the mounting block by about two turns.

c. Verify that the bottom panel as it is positioned on the bench is not touching any of the back panel components. Then reconnect power and turn ON the power switch.

NOTE: be extremely careful when servicing equipment when the circuitry is exposed. Dangerous line voltages are present on back and front panel components.

d. Set the slice thickness to 100 microns, the direction to DOWN and the Blade Height Mode switch to STEP. Depress the Step pushbutton to move the blade height arm to its lowest position at which time the limit switch should deactivate the motion.

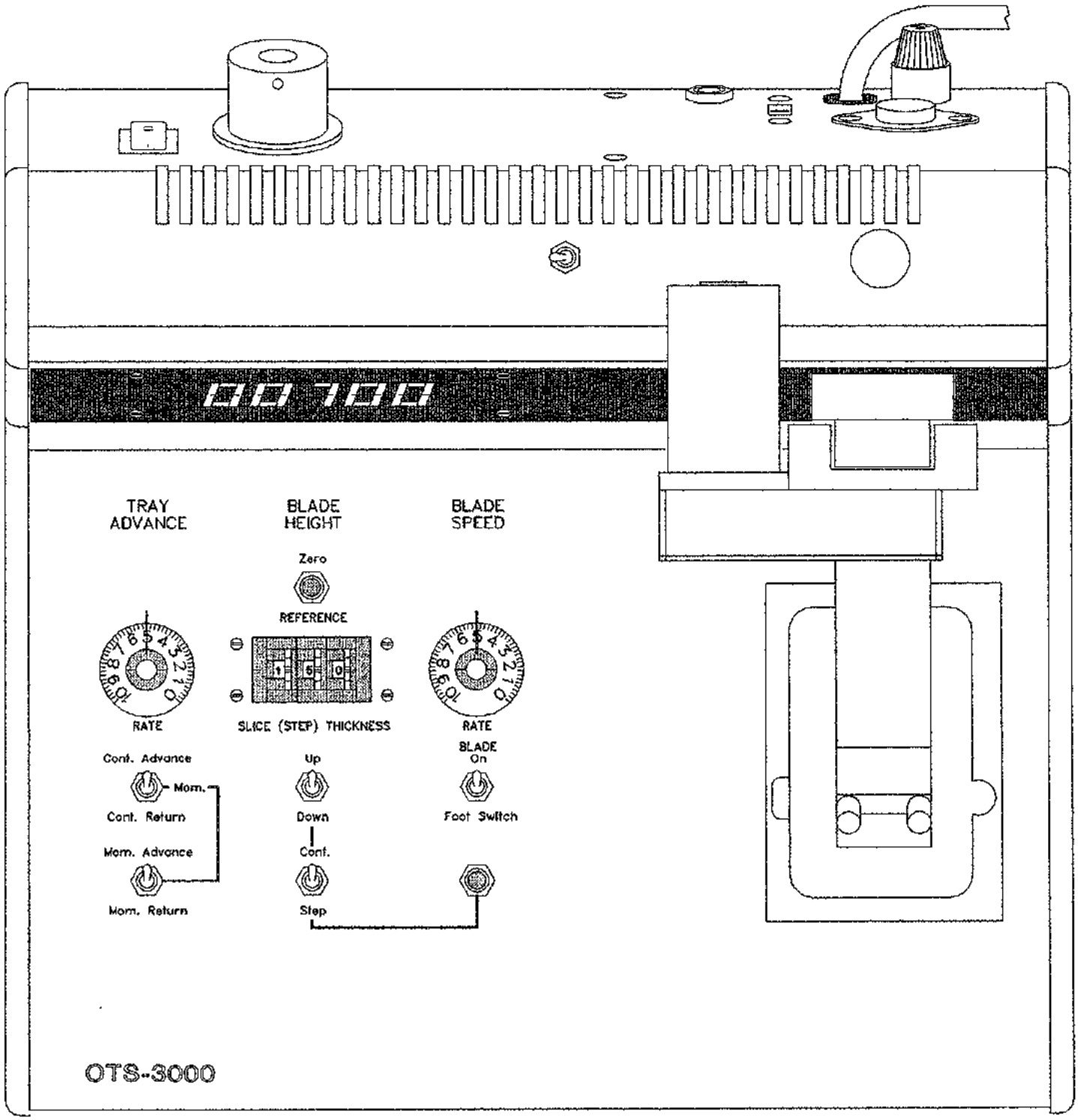
Tighten, the motor mount screws about a quarter turn each at a time until both screws are secure.

e. Set the direction to UP and depress the pushbutton to advance the blade height arm.

Run the blade arm up and down several times in the CONTINUOUS mode to verify that the full range of travel is possible.

f. Turn off power AND disconnect the mains plug. DO NOT proceed without disconnecting the mains!

Replace the bottom panel by reversing the procedure as described in section 3.1, step 4.



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	OTS 3000-05 Front Panel	File 80-10805.cad	