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**USER NOTES:**

*Never run on 10*

**Optimum Settings: Blade at 3; Tray between 3 and 5; slow to 1 or 2; Clearance 15**

Clean and oil guardrails. Make sure nothing is blocking them
1.1 FEATURES

- Section thickness set on thumbwheel
- Pushbutton advance
- Digital display of status
- Linear cutting blade motion to 3000 cycles per minute
- Blade mechanism above bath simplifies maintenance;
- Easy to clean, removable tray
- Motorized variable speed specimen advance
- Momentary or continuous modes
- Auto-sectioning controls permit consecutive sections to be cut automatically
- 20 watt halogen white lamp halogen lamp with fiber optic tube and focusing lens
- x2 magnifying lens (4" dia.) 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-3000-04 Tissue Slicer represents the most thoughtfully designed, reasonably priced solution to sectioning fresh or fixed tissue without the need for embedding or freezing. For maximum precision, it features thumbwheel selection of section 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-3000-04 model includes an auto-sectioning sequence which automatically reverses the tray drive after a section is cut, activates the thickness advance and initiates a new cutting sequence.

The OTS-3000-04 is designed for easy operation and maintenance. All controls can be set with one hand; the blade oscillation is activated either by a toggle switch mounted on the front panel for continuous oscillation or by a foot switch that plugs into a connector on the back panel, freeing the other hand to manipulate the specimen. The switch is activated by depressing the pedal. 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 a magnifier and high intensity halogen lamp which bathes the specimen in "white light" for natural color rendition. The light is transmitted to the sample via a fiber optic tube and 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 mechanical drives in all three dimensions are now made with compliant gibbs which will take any wear and eliminate the necessity for adjustments. The OTS-3000-04 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.

**Section thickness:** adjustable from 10 to 990 microns in 10 micron increments

**Blade speed:** continuously adjustable from 100-300-0 cycles per minute

**Blade motion:** linear, 1.2mm traverse

**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 0.1 -1.0 mm per second; **reverse speed:** 1.2 mm per second

**Blade Amplitude:** Standard of 1.2 mm. Can be easily adjusted by a simple change of available cams.

**Specimen size:** 25 mm (W) x 25 mm (D) x 15 mm (H) maximum volume

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

**Magnifier:** 4” (10 cm) diameter, x2 lens mounted on 12” (30 cm) gooseneck, 9” (25 cm) working distance

**Dimensions:** 11½ " w x 11" d x 5" h (29x28x13 cm), l8 lbs (8kg)

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

1.3.2 CONTROLS / CONNECTIONS

**CONTROLS - FRONT PANEL**

**Tray advance - direction:** 2-position toggle switch for selecting advance or return tray direction.

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

**Tray advance, mode:** 3-position toggle switch (center-off) for selecting continuous advance at the selected rate or momentary advance while toggle is depressed
Manual/Auto mode: 2-position toggle switch. In the manual position the tray drive stops at the end of its forward or reverse travel. In the auto mode, (which must be selected when the tray direction is in the advance position of manual mode), the tray will automatically reverse direction at its maximum forward position (or when the change direction push button is activated), return to the maximum reverse position, activate a slice thickness increment, and then begin a forward cutting sequence.

NOTE: The tray advance switch must be in the continuous position for the tray to move during the auto-section sequence. However, if bunching of tissue is observed, the control can be switched to the stop or momentary position to allow the cutting to even out. Then, the switch can be set to continuous and the auto sequence continued.

Change Direction: Push button (for use in the auto mode) which reverses the tray direction when the tray is advancing. This control permits the operator to save the time that would be used to complete a forward cycle after the section is cut.

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 section thickness selected on thumbwheel switches
Blade height reference: pushbutton switch to zero five digit LED display
Section thickness: 2-digit thumbwheel switches for selecting section thickness in 10 micron increments (least significant digit on 3-digits bank is fixed at 0)
Blade speed: 1-turn potentiometer with calibrated dial for selecting blade speed
Blade motion: A 2-position toggle switch for selecting oscillation either through the toggle switch mounted on the front panel for continuous motion or by an independent foot switch for hands free operation. The foot switch is on 6 ft cordi depress to initiate blade motion.

Lamp: 2-position toggle switch for activating halogen lamp (power switch must also be activated)

CONTROLS - REAR PANEL
- Power: 2-position rocker switch for activating line voltage (indicator LED provided)
- 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

GLASS KNIFE HOLDER:
An optional Glass Knife Holder is available to hold 6.4mm (1/4") thick, 25mm (1") wide glass knives. Simply remove the two screws which hold the Blade Holder in position and replace it with the Glass Knife Holder - retighten screws securely.

SAMPLE VISE HOLDER AND MOUNTING BLOCKS:
The sample vise holder can be easily alternated with the pedestal. 1.2 cm square mounting blocks (provided with the system) or other pegs are held by the vise clamp. The vise jaws are notched to allow for rounded or irregular shaped sample holders.

1.5 ILLUSTRATIVE PROCEDURE

The procedure below illustrates sectioning fresh brain tissue for electrophysiological recording. (NOTE: FOR THIS PROCEDURE THE SAMPLES HAVE BEEN MOUNTED DIRECTLY TO THE PEDESTAL)

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 blade followed by a light sanding with fine emery paper (if needed); clean with alcohol and blot absolutely dry.

3. Prepare a volume of Ringers or other media oxygenated with 95% O₂, 5% CO₂. 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 with oxygenated media (prepared in step 3). 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 sectioning.
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 section through the top of the tissue.

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 section 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 either switch the toggle to blade oscillation or 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 section 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 oscillation motion and advance the tray. The section may float off the blade or remain adhered to it. Use a "000" sable brush (EMS #66100) or a small piece of filter paper to remove the section; store it in a small beaker (EMS #60984,#60986) or sample bottle (EMS #64252) of cooled media until all sections are prepared.

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

If several sections are to be cut, Auto-Sequencing can be initiated by setting the auto-section switch to Auto. Please refer to section 1.3.2 CONTROLS / CONNECTORS for additional information on this feature.

12. When all sections 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 sections. 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.
2.1 REFERENCE MANUAL

2.1.3 INSPECTION
EMS 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 side panel should be removed, and the inside of the module inspected for obvious physical damage.

Since the tray drive is spring loaded, it may become dislodged during the tray mounting operation. This will result in a momentary discontinuity when the tray drive is activated; however the mechanism will reseat immediately.

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 EMS 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 EMS's cost; software upgrades are provided free of charge (if applicable).

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 SERVICES

Should service be required, please contact our Service Department for return instructions at (215) 646-1566. 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 BLADE HOLDER / TRAY DRIVE LENGTH CONSIDERATIONS

Your OTS-3000-04 blade holder is provided with a clamp type holder; loosening the thumbscrew will allow various size 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 the sample.
2.2.1 FIBER OPTIC ASSEMBLY

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.

2.3 TRAY INSTALLATION

The OTS-3000-04 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 the thumbscrews on the side of the slide and tilt 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 reseat automatically.

The sample mounting options for the OTS-3000-04 tray system includes provision for changing the angle relative to the blade oscillation.

The unit is provided with the pedestal system mounted in the sample tray. To remove it from the tray loosen the thumbscrew on the top of the post about half of a turn and, grasping the thumbscrew and the pivot pin, lift the assembly vertically out of the slots.

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.

2.4 OPERATIONAL INFORMATION

The OTS-3000-03 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 such as 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 poor handling than to anoxia, so speed should not be substituted for care.
If mounting directly to the pedestal the block of tissue must be fixed firmly to it. We recommend a cyanoacrylate adhesive (EMS Cat.#72588 or Cat. #72590) 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.

Sections 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 sectioning 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 1.2 mm which has proved suitable for most live and frozen tissue applications. Other cams are available upon request.

Faster oscillation is good for fresh sections more than 200 microns thick. Thinner sections 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 sectioned 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 sections is a compromise between preservation of anatomical integrity (better in thicker sections) and access for metabolites, especially oxygen (better in thinner sections). There are several theoretical and experimental accounts of the thickest section with a metabolically viable center (e.g., Warburg, 1930; Elliot, 1969; Harvey, Schofield & Brown, 1974). Generally, 400 micron sections equilibrated with 95% O₂ - 5% CO₂ at 32 or 37°C are adequate for experiments on hippocampus and cerebellum. If thicker sections are essential it may help to reduce temperature (which slows metabolism) or to try a smaller experimental animal. Sections 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) sections (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 microns sections for processing horseradish peroxidase filled neurons.

Sections can be transferred as they are cut or allowed to accumulate on the blade until the end of the run. A "000" sable brush (EMS Cat. #66100) is recommended for transfer to the recording or holding chamber (Slice Saver, EMS Cat. #71866)
REFERENCES
2.6 INITIAL CHECKOUT

1. AESTHETIC CHECKS
   A. Look for scratches in the case.
   B. Look for threads of Delrin on the tray, pedestal, and vise.
   C. Check lettering to confirm that it is complete and uniform.
   D. Check that the shiny machine surfaces are all painted black.
   E. Look for gaps in the joints of the case.
   F. Check all screws to see if the slots are aligned properly.
   G. Check to see that the two rate control dials on the front panel stop at exactly a reading of 10.
   H. Checked to see that the projection of the fixed 0 of the thickness dial is filed off.

2. FUNCTION CHECKS-MECHANICAL
   A. The tray assembly should slide on and off the platform easily.
   B. The pedestal assembly should slide in and out of the tray assembly easily, and the pedestal assembly should lock in place without pivoting when the thumbscrew is tightened.
   C. The vise assembly should slide in and out of the tray assembly easily, and the vise assembly should lock in place without pivoting when the thumbscrew is tightened.

3. FUNCTION CHECKS-ELECTRICAL
   A. Check to see that all display lights come on when machine is turned on.
   B. Check lamp (switch at base of lamp).
   C. Check zero button.
   D. Check foot switch. Plug foot switch cable into the back of the machine, and with the “blade switch” on the front panel in the “foot switch” position, press on foot switch to see that blade assembly oscillates.

4. FUNCTION CHECKS-ELECTROMECHANICAL
   A. Check the up and down movement of the blade assembly for smooth and quiet operation.
   B. Check to see that the limit switches work to stop upward and downward movement of the blade assembly.
   C. Check to see that the digital readout corresponds to the blade assembly movement.
   D. Check to see that the thumbwheel(section thickness) reading corresponds to the display reading. Set the thumbwheel on settings from 10100 in increments of 10, and press the step button after each increment to see if the thumbwheel reading corresponds to the display reading. Follow the same procedure with numbers 100 through 900 in increments of 100, and also numbers 50 through 950 in increments of 50.
   E. Check the tray advance and the tray return for smooth and uniform movement at various speeds. The drive shaft assemblies should show no eccentric movement.
   F. Check to see that the limit switches work to stop forward and backward movement of tray at various tray advance speeds including the slowest tray advance speed.
3.0 GENERAL DOCUMENTATION INFORMATION

It is our policy to provide comprehensive product documentation with our instruments. Section 3 includes calibration procedures, 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 assemblies for the instrument and individual parts list for each assembly. These part lists include our EMS part or assembly numbers, a general description of the part, and quantities.

Part 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 schematics 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

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

NOTE: The main electronic circuit board is mounted on the bottom panel; it extends over internal flanges of the front and back panels. As a result, the bottom panel does not drop straight down when its mounting screws are removed. Please follow the steps below carefully when removing the bottom panel.

1. 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.
2. Slide the bottom panel a shore distance towards the back of the instrument; this will allow the front of the panel to be pulled down and few inches away from the chassis. Then slide the panel forward until the printed circuit card clears the rear flange and lay it down flat on the bench being careful not to dislodge the plugs which connect the circuit board to the components mounted on the front and back panels. Please refer to drawing 1043; to reposition these plugs if they do become dislodged.

Most mechanical and electrical calibration steps can be accomplished without removing the circuit board from the bottom panel.

3.3 CALIBRATION PROCEDURE

PLEASE REFER TO ASSEMBLY DRAWING 1185Cl.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.

A. See Section 3.1 for disassembly.

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 ar ound backwards from its normal orientation and position it on 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 2 below. If it is not, loosen the two flat head screws (B on assembly 1185cl.xx drawing) which secure the holder to the Blade Carrier (46) and reposition it parallel.

NOTE: It is good practice to install all screws that are subject to vibration using a small amount of silicone 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 (At 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.

   G. Check that pedestal is parallel to blade.

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

D. Step the blade arm assembly down through the entire range of the dial gauge, checking that each step measures 0.01 ± 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).

6. MOTOR SPEED ADJUSTMENTS

Trimpots to adjust the blade and tray drive speeds are located on the back of the logic printed circuit board and are accessible through the cooling slots in the back of the instrument. BE CERTAIN TO USE A NON-CONDUCTING TRIMMER ADJUSTING SCREW DRIVER to avoid shorting any electrical components.

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 fully 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 #3 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 4.8 VDC.