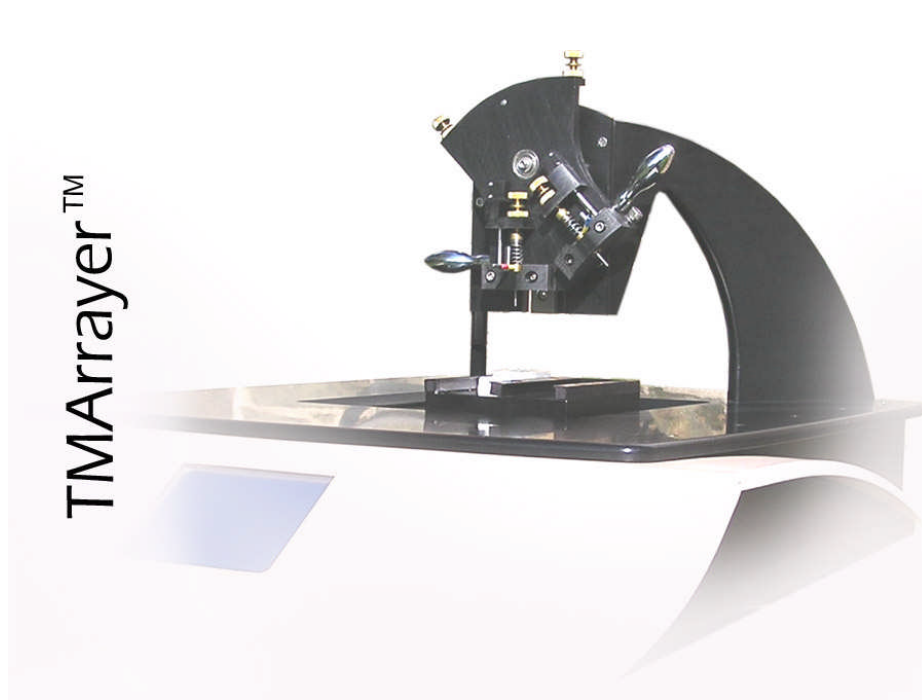


# TMArrayer™ Users Guide



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To date, the most efficient method of constructing tissue microarrays is by extracting cylinders of donor tissue with a sharp punch and then assembling them into a Recipient Block of embedding media that has properly sized receptacle holes prepared in a grid pattern. Once the donor tissue cores are placed into the receptacle holes, the block can be sectioned many times to provide nearly identical tissues arrays on slides for further parallel analysis. Up to 200 sections can be produced from a single Recipient Block, which depending on core size, may contain up to 600 individual donor tissue samples. The savings in labor, reagents, and even valuable tissue eclipses the minimal effort to create a tissue microarray block.

The Pathology Devices TMArrayer™ is designed to provide users with a simple to use yet precise instrument for the construction of tissue microarrays. Movement of the Recipient Blocks is automated through the simple touch screen panel; you can setup and create arrays in up to four Recipient Blocks without the need to tediously move between positions manually. All of the critical processes of collecting and transferring cores from Donor Blocks to the Recipient Blocks remain under the users control.

Adjustable stops are included to precisely deposit the donor core at the desired depth either just at the Recipient Block's surface or even below the surface in order to reduce wasting of valuable sections before all cores are present. During core deposit one stop determines the position of the Donor Punch with respect to the Recipient Block surface, and the other stops the Stylus at a known position every time for precise deposits. And finally, another stop is included to maintain a consistent depth during the preparation of the Recipient Block cores. Recipient cores that are too shallow can lead to distorted donor deposits, and running the preparatory punch to the cassette leads to damaging of the punch.

THE PUNCHES ARE SHARP AND PROPER PRECAUTIONS MUST BE TAKEN TO PREVENT ACCIDENTAL INJURIES. USERS MUST REGARD THESE PUNCHES AS HYPODERMIC NEEDLES THAT HAVE BEEN EXPOSED TO HAZARDOUS MATERIALS. PROPER LAB PRACTICES MUST BE OBEYED IN THE HANDLING AND DISPOSAL OF THE PUNCHES.

### Proper Operation

Proper operation of this equipment relies on the user reading this user guide in its entirety.

### SHARP POINTS

THE PUNCHES ARE SHARP AND PROPER PRECAUTIONS MUST BE TAKEN TO PREVENT ACCIDENTAL INJURIES. USERS MUST REGARD THESE PUNCHES AS HYPODERMIC NEEDLES THAT HAVE BEEN EXPOSED TO BIOHAZARDOUS MATERIALS. PROPER LAB PRACTICES MUST BE OBEYED IN THE HANDLING AND DISPOSAL OF THE PUNCHES AND TISSUE.

### Electrical Shock

DO NOT OPEN THE HOUSING FOR ANY REASON as there are no user serviceable parts inside and potentially dangerous voltages may be present even with the power cord disconnected.

### Electrical Shock

Use only properly grounded outlets.

### Other Uses

The Equipment is intended to be strictly dedicated to the construction of tissue microarrays in paraffin Recipient Blocks. Operation of the Equipment for any other purpose may result in permanent damage to the Equipment or may create a harmful situation for the user. THE USE OF THIS EQUIPMENT FOR ANY OTHER PURPOSE THAN ORIGINALLY INTENDED MAY DAMAGE THE EQUIPMENT, INJURE THE USER, AND VOID ALL WARRANTIES.

### Cleaning of the Arrayer

The TMArrayer™ may only be wiped down with a damp cloth or a cloth wetted with solvents such as Paraguard or Toluene. DO NOT use abrasive cleansers. Care must be taken to prevent injury from the installed punches.

### Touch Screen Operation and Cleaning

Never use a pen tip or sharp metal devices on the touch screen. Operate the touch screen with a gentle touch, very little pressure is required to activate it.

CLEAN THE TOUCH SCREEN WITH A SOFT DAMP NOT WET CLOTH ONLY. NEVER USE AMMONIA BASED CLEANSERS.

### Service

DO NOT ATTEMPT TO SERVICE THE EQUIPMENT unless otherwise instructed to do so by an authorized Pathology Devices, Inc. representative. Doing so will void the warranty or service contract.

### Fuses

Replace only with same type and rating.

The basics to constructing a tissue array block is to prepare an embedding media block that will become the Recipient Block, prepare a hole in the Recipient Block for a donor sample core to be inserted, cutting a core of the donor tissue, depositing the tissue into the hole, and then moving to the next location on the Recipient Block.

To that end, the TMArrayer™ consists of an automated X-Y Stage for accurately moving between row and column positions as well as moving to the other Recipient Blocks, a Touch Screen Controller for status display and position control, a Punch Mechanism for the positioning and manipulation of the punches during array construction, and a donor clamp support.

The X-Y Stage has a positional resolution of 0.5  $\mu\text{m}$ , however in real life manufacturing tolerances, servo stability, lead screw backlash, and other influences reduce the system's total accuracy to 1.5  $\mu\text{m}$ . Basically imperceptible. The range of motion is limited to processing four standard tissue cassettes in order to minimize the instrument's footprint and weight.

A touch screen display was added to simplify the User Interface. Standard computer type buttons, options, text fields are displayed in very obvious graphics without the need for external keypads or cryptic commands in simple text displays. The touch screen controller walks you through the steps required to setup the instrument to your own array design and even saves the setup configuration for future use or in case of a power shutdown and restart. Settings such as what units the position is to be displayed as, spacing between cores, and starting position on the Recipient Block are all prompted for in the setup. Continue and Back commands allow the user to change parameters if desired. The Run Screen provides the necessary functions to create an array. Up, Down, Left, and Right buttons move the Recipient Block by one Row or column (as determined by the core spacing parameter). Block moves are accomplished by touching one of the four buttons that resemble the configuration of the Recipient Blocks. During all moves, a graphic in the middle of the buttons indicates when the motion has stopped.

The Punch Mechanism is where it all comes together to create the arrays. Two separate Punches are clamped to a pivoting plate that allows precise positioning of the punches with respect to the Recipient Block, and to each other, so the donor core can be inserted properly into the prepared receptacle of the Recipient Block. Adjustments are provided to ensure the concentricity of the punches while in operation, and adjustments are provided to assist in positioning the donor core at the proper height in the Recipient Block. The Punch Mechanism also provides a precision vertical slide to reliably hold the punches perpendicular to the top surface of the recipient, and Donor Blocks for proper punching. If the vertical slide allows the punches to wiggle, then there is no control over the precision of the array. One Punch (the Recipient Punch) is used to prepare a hole in the Recipient Block to receive a donor core, and the other punch (the Donor Punch) is used to cut a core of donor tissue to be placed in the Recipient Block. The punches are of differing sizes and are matched so that the donor core fits snug in the Recipient Block. If the fit is too snug then the core may get distorted or damaged during insertion and if the fit is too loose then the core may not adhere to the surrounding embedding media during sectioning. Therefore, the Donor Punch is always larger in diameter than the Recipient Punch. Each Punch assembly consists of a sharp

punch tube which performs the coring, a hub to mount the punch tube, a solid wire Stylus that slides inside of the punch tube to expel the cored material, a Stylus Hub used to hold the Stylus, and a handle mounted to the punch hub to assist in rotating the punch hub about its axis for breaking free difficult sample cores.

Finally, a Donor Block is clamped to the donor support for coring. The addition of a clamp allows you to keep your hands away from the exposed sharp punches during donor coring and eliminates the tendency for the Donor Block to stick to the punch requiring the you to hold it down while the punch is withdrawing from the Donor Block.

## **Specifications:**

Supply Voltage:	100-240VAC, 5A, 47/65 Hz, 1.7A
Range of motion:	90 mm x 90 mm
Speed:	30 mm / sec
Positional Resolution:	0.5 $\mu$ m
Positional Repeatability:	1.5 $\mu$ m
Average move time:	< 2.0 sec
Punch Options:	0.6, 1.0, and 2.0 mm
Weight:	9.5 kg
Size D x W x H:	520 x 403 x 232 mm
Operational Temperature Range	25 - 35°C
Operational Humidity Range	0 – 85% non-condensing
Warm-up time for stabilization	< 30 min. but depends on room temperature
Storage Temperature	-30 – 70°C

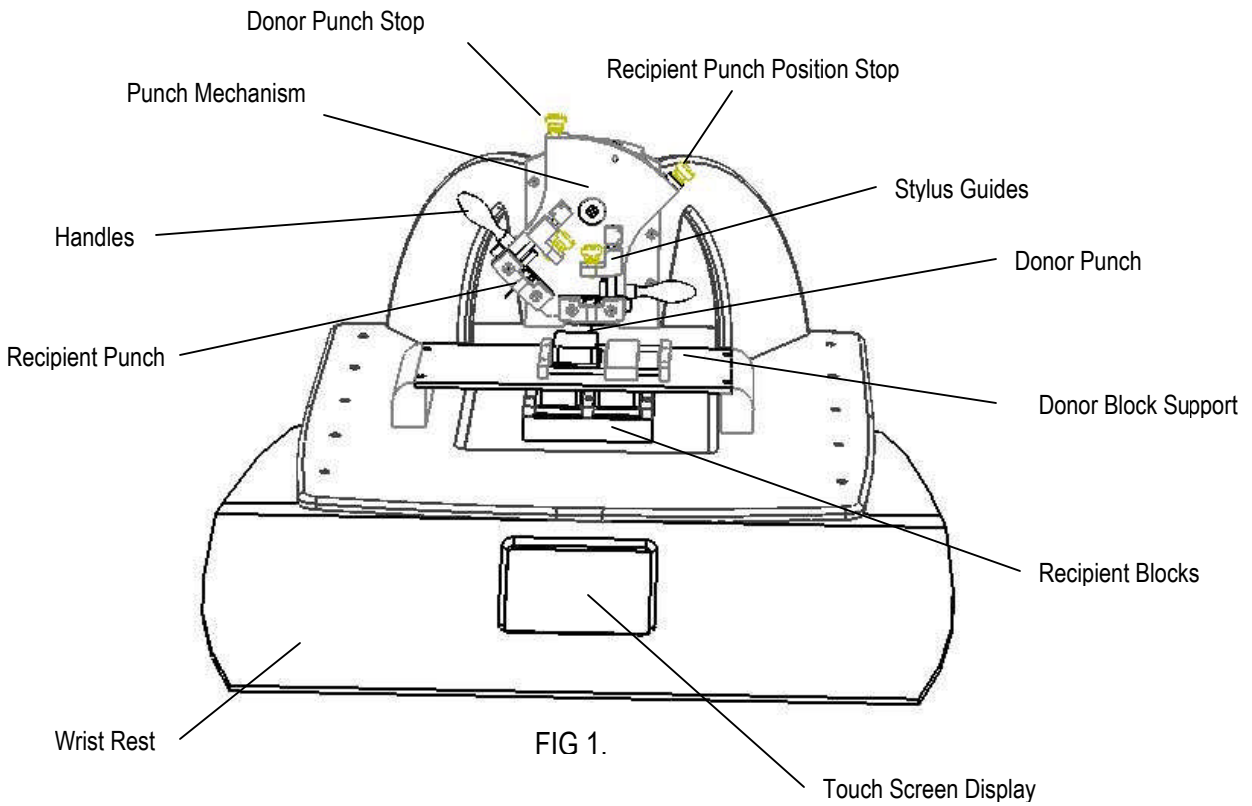


FIG 1.

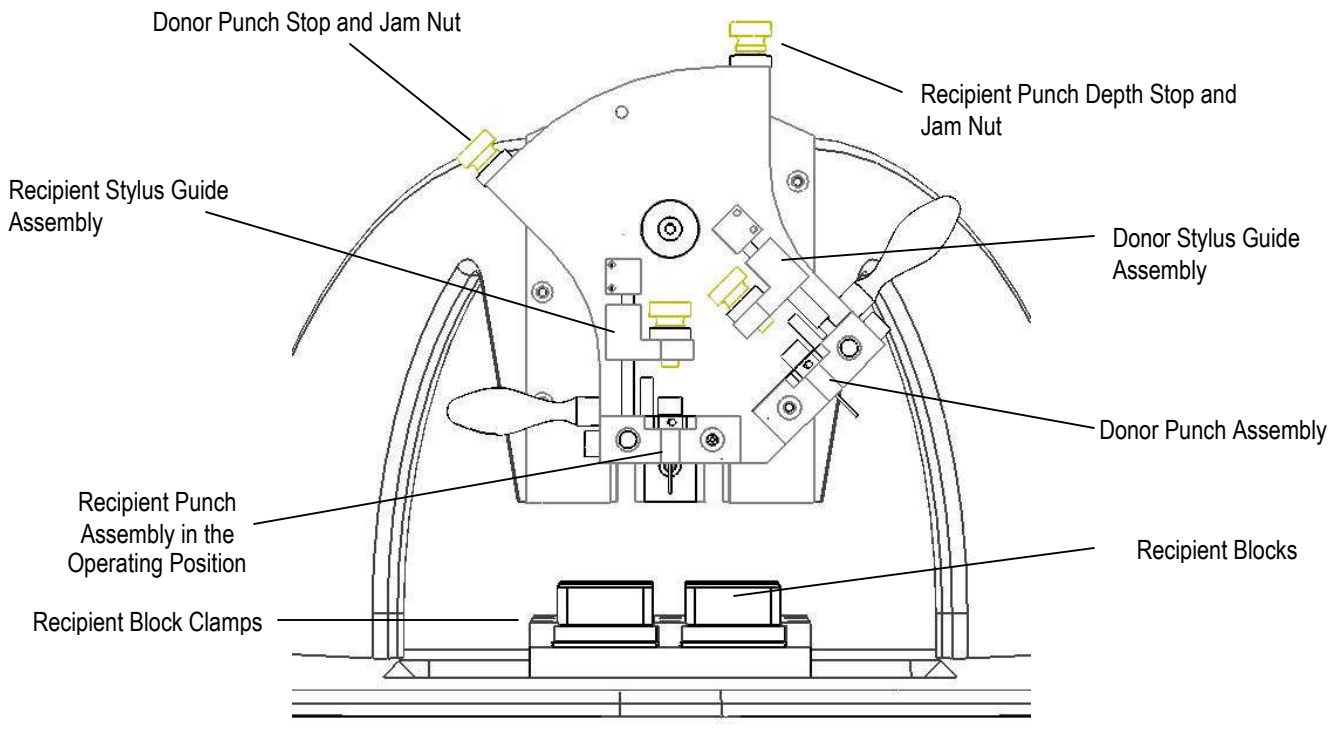


FIG 2. Front View

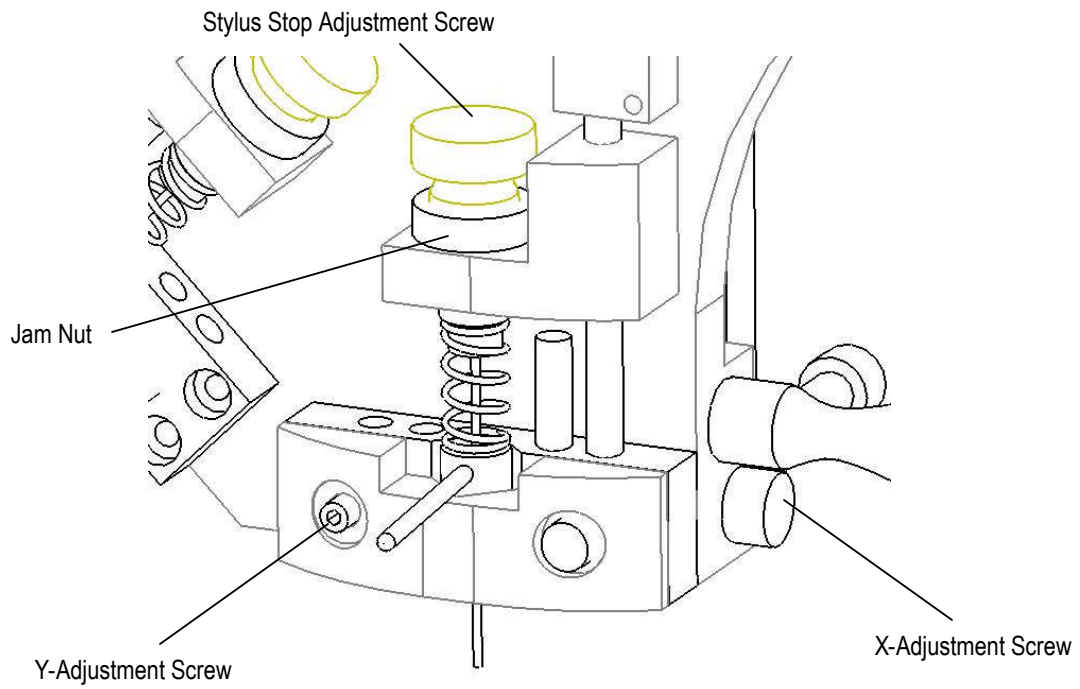


FIG 3. Adjustments

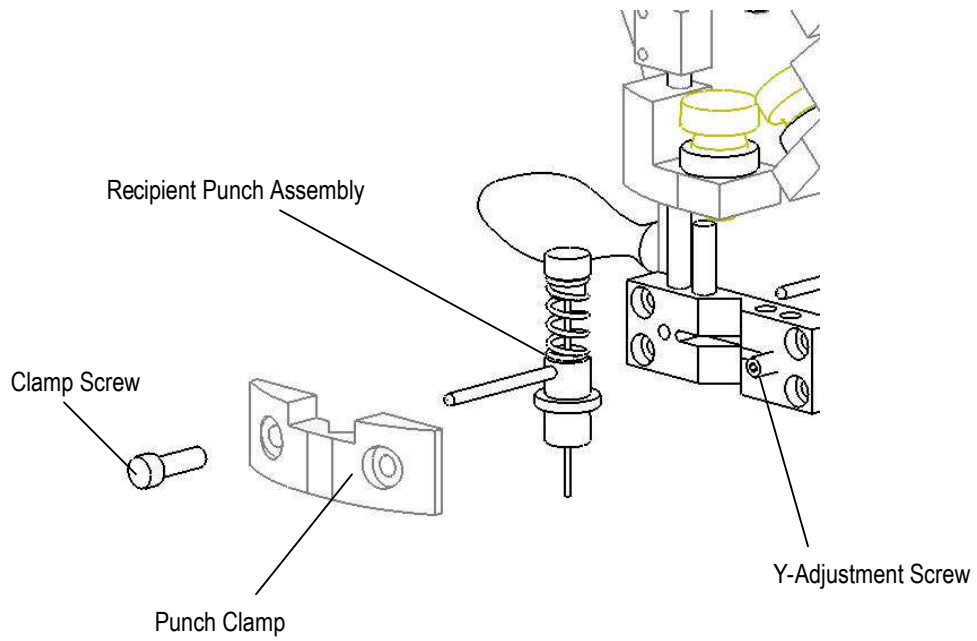


FIG 4 Punch Installation

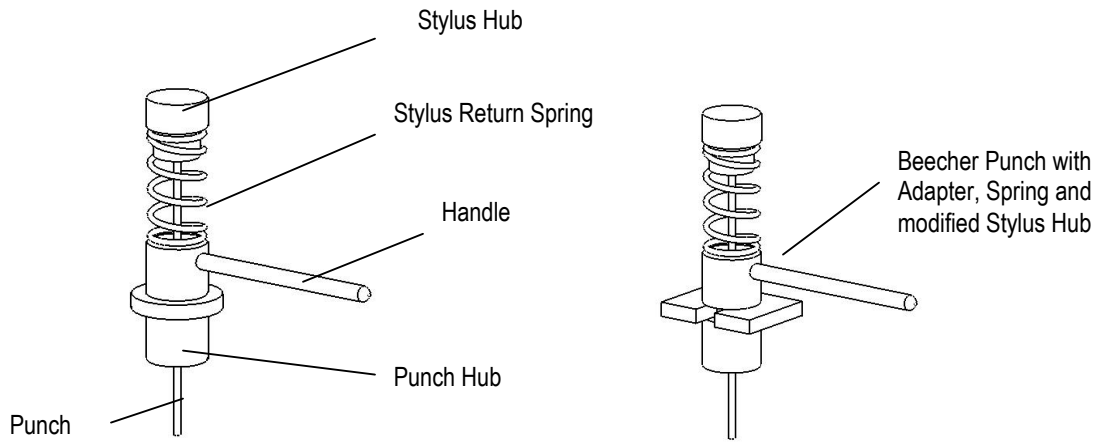


FIG 5. Punch Assemblies

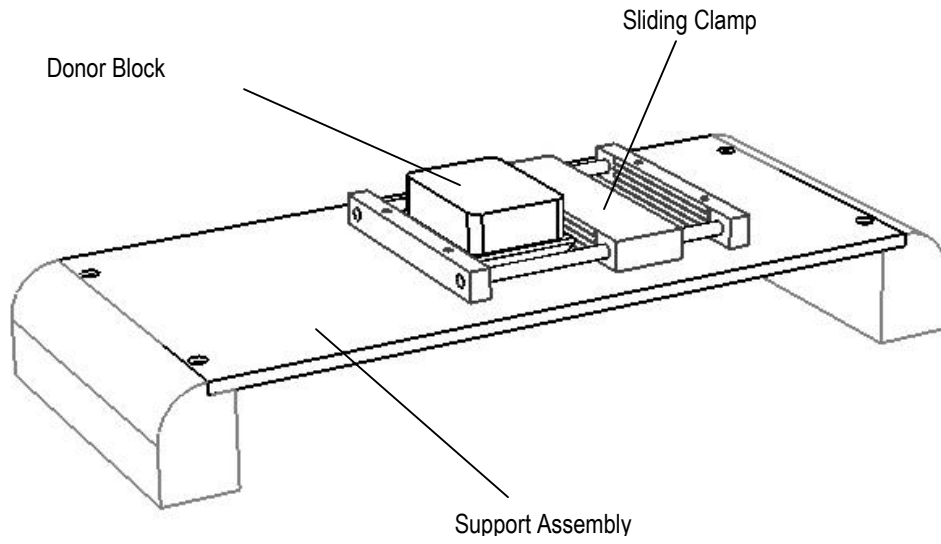


FIG 6. Donor Block Support

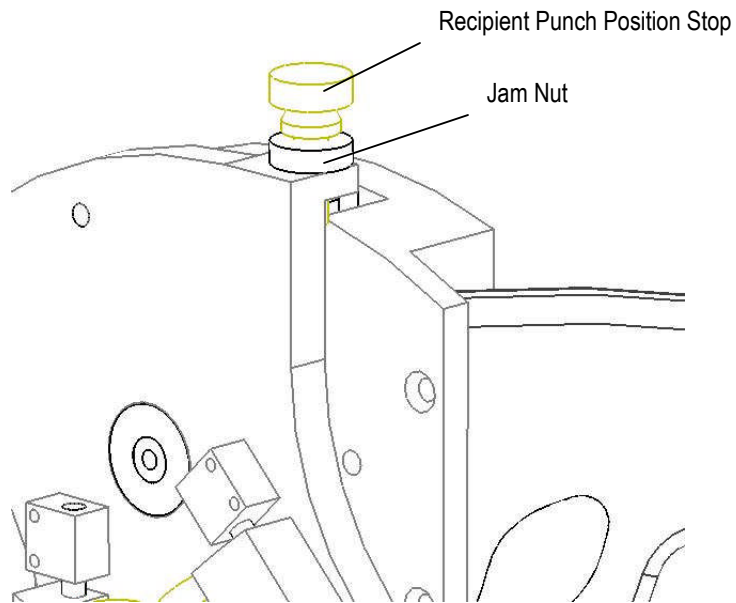


FIG 7. Position Stop

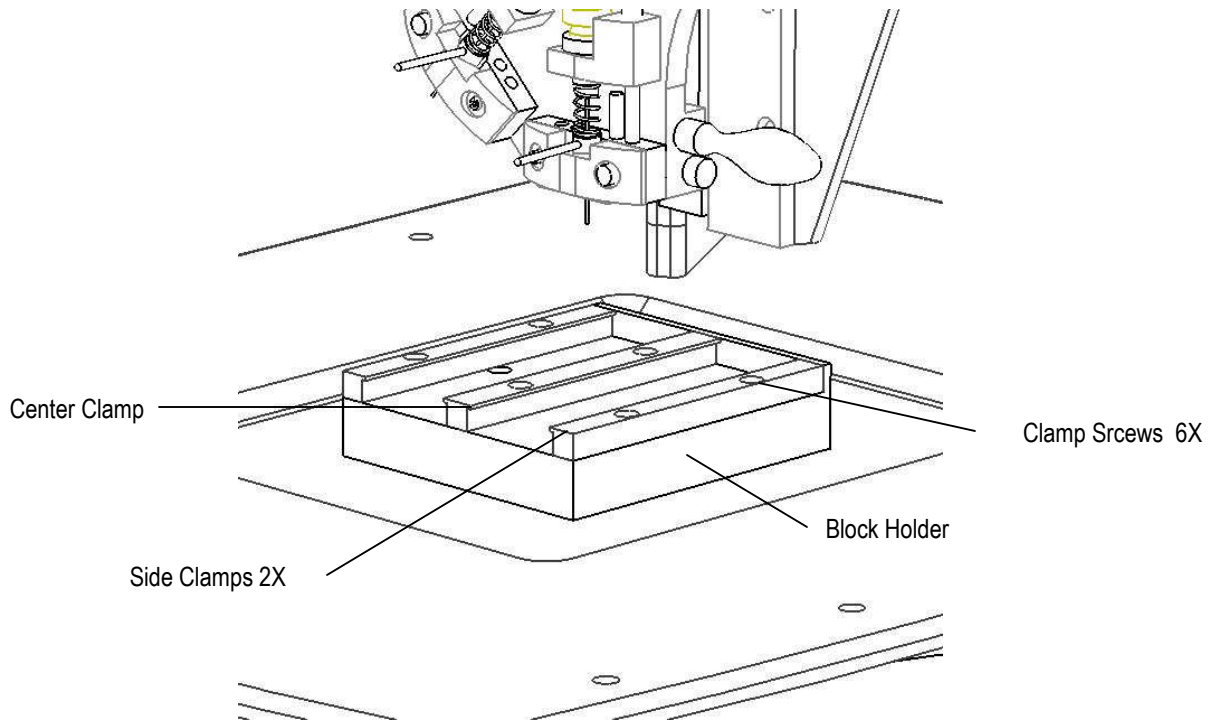


FIG 8. Block Holder and Clamps

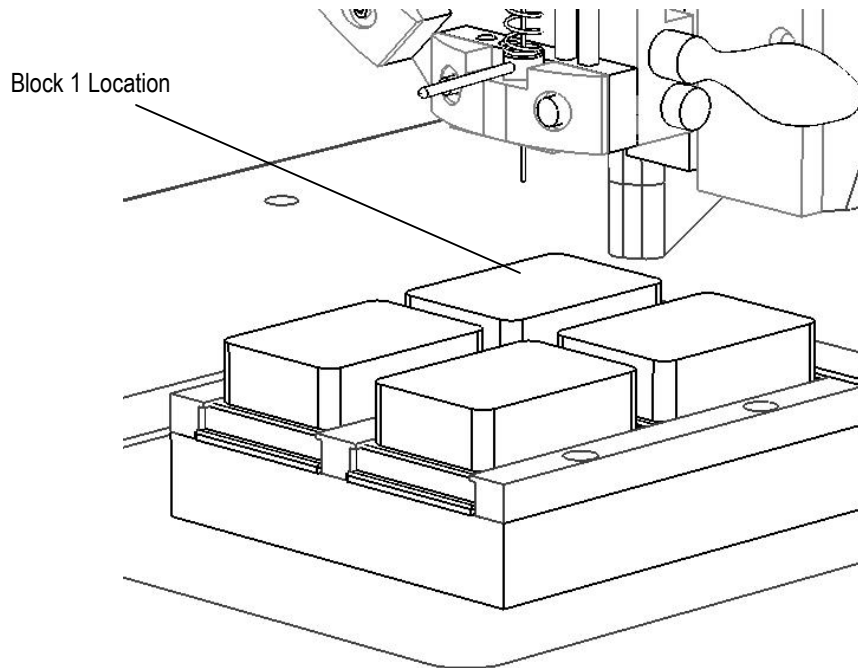


FIG 9. Block Holder Recipient Blocks Installed

<b>Punch Mechanism</b>	Contains all of the components for preparing and transferring cores to the Recipient Blocks.
<b>Donor Block Support Assembly</b>	Provides a rigid platform to support the Donor Block during alignment and core extraction. The Clamp is provided to keep the Donor Block from lifting up as the punch pulls a core.
<b>Touch Screen Display</b>	All motions and setups are controlled and stored in the touch screen controller. Instrument status is displayed as are the current positions.
<b>Stylus Guide Assembly</b>	To improve Stylus actuation and precision, the Stylus is guided by a spring loaded slide that stops at a fixed location. To adjust how far beyond the end of the punch the Stylus extends when actuated, there is a Stylus Adjustment Stop Screw and Jam Nut. Repeatable positioning of the Donor Core in the Recipient Block is possible without effort.
<b>Recipient Block Clamps</b>	The Recipient Blocks are held firmly in place by clamps that screw down.
<b>Punch Assembly</b>	The Punch Assembly consists of a sharp Punch Tube, a Punch Hub that the Punch is fixed inside of, a Stylus that runs inside of the Punch Tube, a Stylus Hub that the Stylus is fixed inside of, and a Handle that is used to rotate the Punch while clamped into the Punch Mechanism.
<b>X- Adjustment Screw</b>	Tolerances in the manufacturing of the Punch Mechanism, and to a lesser extent the Punch Assemblies, leads to difference in the exact location of the Punch with respect to

	the Recipient Block. Two adjustments are available to center one Punch with respect to another. The X-Adjustment Screw is used to bring the Punches together in the x-axis direction (left to right)
<b>Y- Adjustment Screw</b>	The Y-Adjustment Screw is used to bring the Punches together in the y-axis direction (front to back)
<b>Stylus Stop Adjustment Screw</b>	Is used to control how far the Stylus extends beyond the tip of the Punch during extrusion of the core from the Punch. With the Stylus slightly extending beyond the tip of the Punch, the Donor core can be deposited just below the surface of the Recipient Block.
<b>Jam Nut</b>	Jam Nuts exist to keep the adjustment screws locked in place after adjustment.
<b>Recipient Position Stop Screw</b>	This stop controls how far down the Punch Mechanism goes during a Receptacle Core extraction. This should be adjusted as deep as possible. The Punch should be just to be above the plastic cassette when held down. The Jam nut is then tightened
<b>Donor Position Stop Screw</b>	This stop controls how far down the Punch Mechanism goes during a Donor Core deposit. The Punch should be adjusted such that it is just at the top surface of the Recipient Blocks when held down. The Jam nut is then tightened
<b>Stylus Hub</b>	Holds the Stylus
<b>Punch Hub</b>	Holds the Punch
<b>Stylus</b>	Is a solid wire used to push out (extrude) either the receptacle waste core during preparation of the Recipient Block, or the Donor tissue core into the Recipient Block.
<b>Stylus Return Spring</b>	Effective core extraction depends on having the Stylus run free inside of the Punch. The Stylus Return Spring assists in clearing any residual paraffin build up by allowing you to actuate the Stylus several times quickly to clear the punch. Core extraction is also improved when the Stylus does not impede the core during the cut.
<b>Punch Handle</b>	A sharpened thin walled tube used in coring.
<b>Recipient Block</b>	Is used to rotate the Punch during core extraction
	Is a tissue cassette prepared with embedding media intended to receive donor cores
<b>Donor Block</b>	Archival tissue specimens.

### Un-Packing:

The following is a list of the packaged items:

- 1 – TMArrayer™ Unit
- 1 – Power Cord
- 1 – 3/32" Hex Driver Tool (used to install Punch Clamp, and Block Clamps)
- 1 – 0.05" Hex Driver Tool (used to adjust Y-Adjustment Screws)
- 1 – 5/64" Hex Driver Tool (used during troubleshooting)
- 1 – 9/64" Hex Driver Tool (used to adjust X-Adjustment Screws)
- 1 – Support Assembly
- 1 – Users Guide

Please reserve the packaging in case the unit needs to be returned for repair or upgrading.

### Installation:

The installation process is:

STEP 1: Set the TMArrayer™ Unit on a sturdy surface in an area with good lighting and a comfortable chair.

STEP 2: Connect the power cord and plug in. The power switch is at the power entry.



**NOTE:** It is important to have good lighting and a magnifying glass to make observations.

### Punch Installation and Adjustment:

Punch installation is relatively easy and can be accomplished in seconds. One thing to note is that this instrument is designed to use punches sourced from Beecher Instruments, or Pathology Devices since many labs have already invested in Beecher Punches.

To install, see figure 4. The Punch Assembly is held in place by clamping the Punch hub into the VEE shaped grooves of the Punch Mechanism with the Punch Clamp held by the Clamp Screw. The Clamp Screw is tightened until the punch is snug yet can rotate using the Handle. **DO NOT OVERTIGHTEN.** For use with Beecher Instruments Punches, we provide a simple adapter plate that fits in the groove of the Punch Hub. However, for full functionality, the punch Stylus Hub needs to be modified for use with the Stylus Return Spring.

The most critical step to achieve the best performance is the concentric adjustment of one punch to the other. This is accomplished easily enough by installing the Punches, punching a hole in a blank paraffin Recipient Block with the Recipient Punch, switching to the Donor Punch and adjusting the punch position with respect to the recipient hole with the X and Y adjustment screws provided.


In more detail:

Step 1: Pivot the Punch Mechanism to prepare a receptacle hole in a blank Recipient Block.

Step 2: Punch a core as described in the Detailed Operation.

Step 3: Pivot the Punch Mechanism to the donor position.

Step 4: lower the Punch Mechanism and observe how the Donor Punch and receptacle hole line up. Since the donor Stylus is approximately the same size as the receptacle hold, it may be helpful to adjust the donor Stylus so that it can extend into the hole in order to better see the adjustment.


 **NOTE:** It is important to use a magnifying glass to make this observation.

Step 5: If the punch needs to be moved to the right, then turn the X-Adjustment Screw clockwise.

Step 6: If the punch needs to be moved to the left, then turn the X-Adjustment Screw counter clockwise.

Step 5: If the punch needs to be moved forward, then turn the Y-Adjustment Screw clockwise.

Step 6: If the punch needs to be moved to be back, then turn the Y-Adjustment Screw counter clockwise.

 **NOTE:** It is important to check the alignment every time the punches are replaced or possibly bent.

### **Travel Stop Adjustments:**

Four travel stops are provided: one stop is used to reliably core the maximum receptacle depth hole in the Recipient Block, another stops the Donor Punch at the surface of the Recipient Block during a core deposit, the third is used to determine where the donor Stylus stops when extruding the donor core into the receptacle hole, and finally the recipient Stylus stop which is the least important.

The optimum setting for the Donor Punch Stop is when the Donor Punch is stopped just at the surface on the Recipient Block when you go to deposit the core. This will likely need to be adjusted with each new introduction of new Recipient Blocks. In the case where multiple blocks are to be populated, you should make sure they are all close in thickness and the adjustment should be made to the shortest block.

### **Donor Punch Stop Adjustment In Detail:**

Step 1: Insert the Recipient Blocks and clamp them down See Fig 8.

Step 2: With the shortest Recipient Block identified move to that block.

Step 3: Pivot the Punch Mechanism to the Donor Punch position.

Step 4: loosen the Jam Nut all the way (counter clockwise) and screw the Donor Stop adjustment screw all the way down (clockwise). This will make sure the punch does not touch the Recipient Block when you lower the mechanism.

Step 5: Carefully lower the Punch Mechanism making sure that it does stop before hitting the surface of the Recipient Block. If it does hit the surface, then the Donor Stop Screw is not adjusted all the way down or the Donor Stop Screw is too short for your Recipient Block configuration. Please call for assistance in that case.

Step 6: While holding the Punch Mechanism down, adjust the Donor Stop Screw (counter clockwise) until the Donor Punch just touches the surface.

Step 7: Raise the Punch Mechanism and while holding the Donor Stop Screw, tighten its Jam Nut to hold it in place.

Step 8: Verify the position remained unchanged.

### **Recipient Punch Stop Adjustment In Detail:**

- Step 1: Insert a bare tissue cassette and clamp it down.
- Step 2: Pivot the Punch Mechanism to the Recipient Punch position.
- Step 3: loosen the Jam Nut all the way (counter clockwise) and screw the Recipient Stop Adjustment screw all the way down (clockwise). This will make sure the punch does not touch the cassette when you lower the mechanism.
- Step 4: Carefully lower the Punch Mechanism making sure that it does stop before hitting the surface of the cassette. If it does hit the surface, then the Recipient Stop Adjustment screw is not adjusted all the way down or the Recipient Stop Adjustment screw is too short for your Recipient Block configuration. Please call for assistance in that case.
- Step 5: While holding the Punch Mechanism down, adjust the Recipient Stop Adjustment Screw (counter clockwise) until the Recipient Punch just touches the surface.
- Step 6: Raise the Punch Mechanism and while holding the Recipient Stop Adjustment Screw, tighten its Jam Nut to hold it in place.
- Step 7: Verify the position remained unchanged.

### **Donor Stylus Stop Adjustment In Detail:**

- Step 1: Pivot the Punch Mechanism to the Donor Punch position.
- Step 2: loosen the Jam Nut all the way (counter clockwise) and unscrew the Donor Stylus Stop Adjustment Screw all the way (counter clockwise).
- Step 3: While holding the Punch Mechanism UP and Pushing the Donor Stylus Guide down, adjust the Donor Stylus Stop Screw (clockwise) until the Donor Stylus extends beyond the punch by the amount you would like to the core BELOW the recipient surface.
- Step 4: While holding the Donor Stylus Stop Screw, tighten its Jam Nut to hold it in place.
- Step 5: Verify the position remained unchanged.

### **Recipient Stylus Stop Adjustment In Detail:**

- Step 1: Pivot the Punch Mechanism to the Recipient Punch position.
- Step 2: loosen the Jam Nut all the way (counter clockwise) and unscrew the Recipient Stylus Stop Adjustment Screw all the way (counter clockwise).
- Step 3: While holding the Punch Mechanism UP and Pushing the Recipient Stylus Guide down, adjust the Recipient Stylus Stop Screw (clockwise) until the Recipient Stylus extends just beyond the Recipient Punch.
- Step 4: While holding the Recipient Stylus Stop Screw, tighten its Jam Nut to hold it in place.
- Step 5: Verify the position remained unchanged.

### **Block Installation Detail:**

- Step 1: Slide the Recipient Blocks in place.




**NOTE:** It is important if only one Recipient Block is used that it be located in the Block1 position. Block1 position must always be populated.

Step 2: Tighten the Clamps with the 3/32" hex driver tool provided. The screws only need to be tight enough to prevent the Recipient Block from moving. DO NOT over tighten or the Recipient Blocks might be damaged.

### Software Setup:

All of the settings and movements are controlled through the touch screen interface. It is not necessary to use a Stylus to use the touch screen display, but if you do have trouble, a soft plastic point can be used in place of a Stylus, or one can be provided upon request.

 **NOTE:** Never use a pen tip or sharp metal devices on the touch screen. Operate the touch screen with a gentle touch, very little pressure is required to activate it.

The Splash Screen is presented on power-up and remains until the x-y stage has initialized.

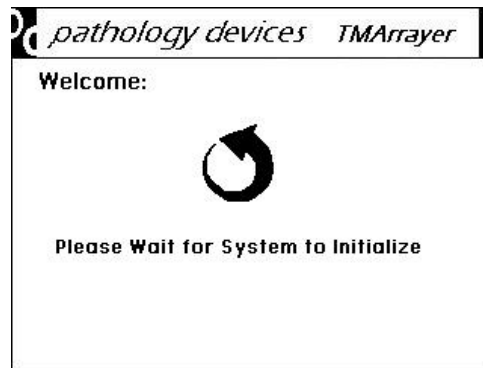


Fig. 10

The First Step (Step 1:) is to configure the TMArrayer™ with how you want the positions displayed. You have the choice of row, columns (row, col), or millimeters (mm). The Cryogenic array construction is reserved for future upgrades. Selecting the method is as easy as touching the option button or the text associated with it. The active options are filled in and only one option can be chosen at any one time. When ready touching the Continue Button will take you to the Spacing Between Cores screen.

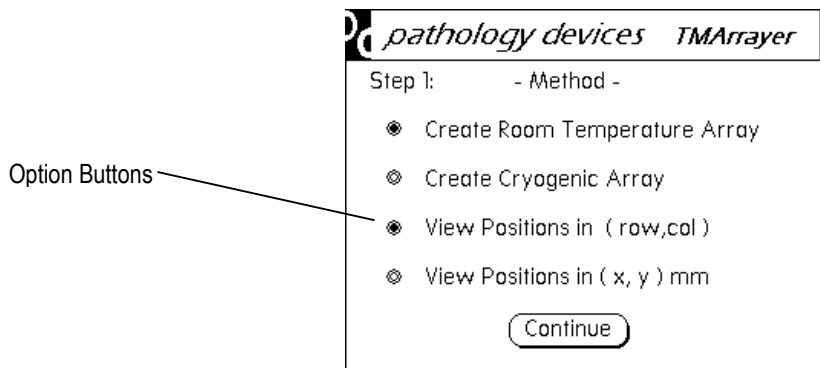


Fig. 11

The next step (Step 2:) sets the Spacing Between Cores. Depending on the Punch diameter, this setting must change. Some distance between cores is required to minimize distortions in the array. Since the Recipient Punch has some physical wall thickness to the Punch, the embedding media gets displaced ever so slightly. As the core get closer, the distortion worsens. Even so, quality arrays can still be produced with 0.7mm spacing using a 0.6mm punch, 1.2mm spacing with a 1.0mm punch, and 2.5 with 2.0mm punches. The spacing value entered applies to both rows and columns, the spacing is the same for both see Fig 12. To change the spacing the Up and Down buttons can be used to change the spacing by 0.01mm increments or holding the buttons will cause it to change quickly. The buttons change to inverse video when pressed and the data is changed when the button is released. Touching the Continue button will bring you to the Starting Point screen and touching the Back button will send you back to the Method screen.

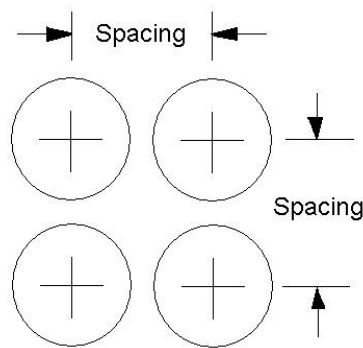


Fig. 12

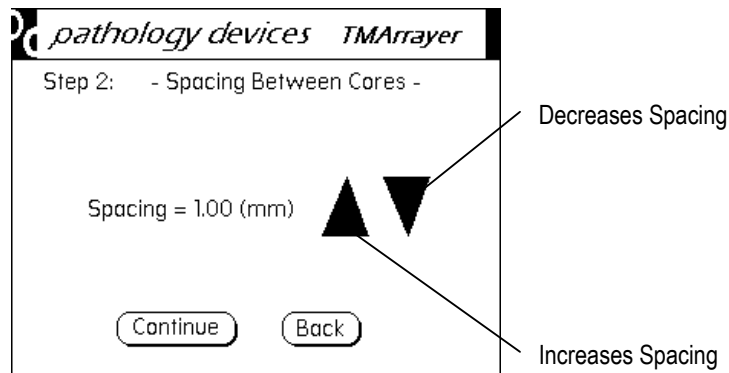



Fig. 13

The Final step (Step 3:) allows you to determine the starting point of your array on the actual Recipient Block. You have control over the X and Y position that you will use as the upper left corner of the array Row 1, Column 1. This position is used for all of the blocks as the starting point.

 **NOTE:** You must choose the starting point carefully, once the starting point is defined, there is no way to place cores above or to the left of the starting point unless the array is ended, the complete option selected, and is powered down. See Fig 14

As you change the X and Y starting point positions with the Up / Down buttons, the stage will move. Each button press changes the position by 0.1mm, and holding the buttons down will cause it to change and move quickly.

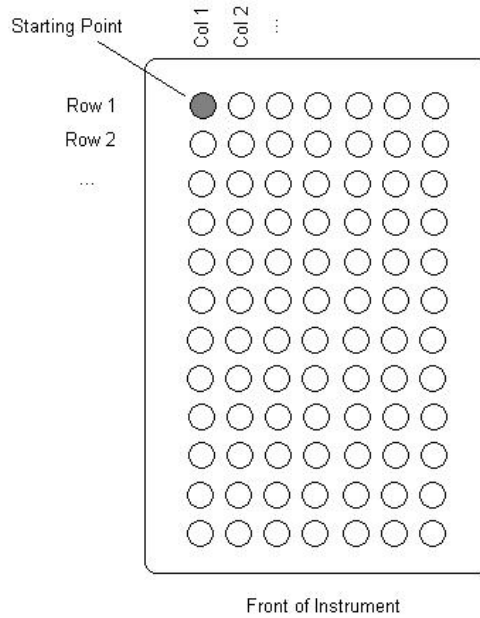


Fig. 14

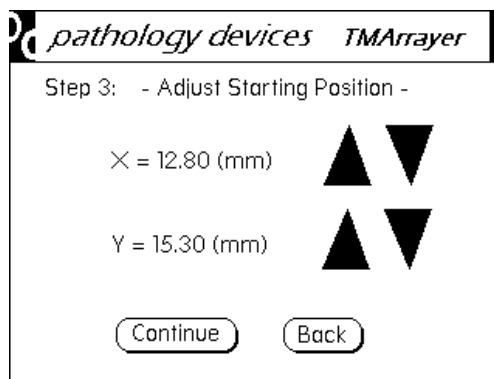


Fig. 15

Touching the Continue button will bring you to the RUN screen and touching the Back button will send you back to the Adjust Starting Position screen.

Once in the Run screen you cannot go back to the setup unless the Run is ended and the unit powered off. The Run screen allows you full control of which block is active and allows you control

of the row and column to place cores. The block select buttons are as viewed from the front of the instrument. Meaning: Block1 is towards the back of the instrument and to the left. If the motion control system is active, the animation will be moving. Once stopped, you are free to place cores. Exiting the Run screen takes place by touching the End button. The End button sends you to the Shutdown Option screen.

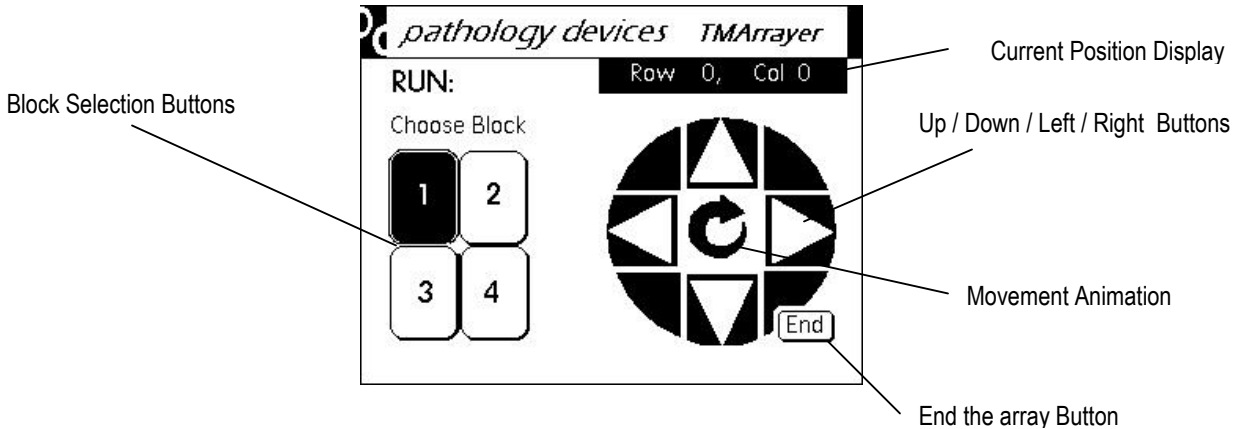


Fig. 16

The Shutdown Option screen allows you several choices. If you want to shutdown the system and pickup the arraying a later date, then select the “Resume Array Position After Shutdown”, if the array is complete and you no longer need positions saved then choose “Array Complete”, and if you accidentally touched the End button and want to return to the RUN screen select the “Return” option. Only one option can be selected and the active selection is filled in. The controller will act on the option when the Continue button is touched.

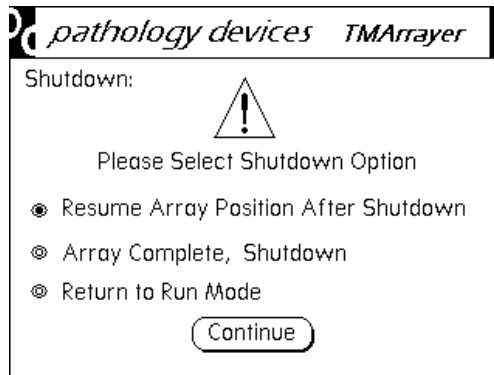


Fig. 17

The Controller will have saved all data and will tell you when it is safe to Power Down the unit.

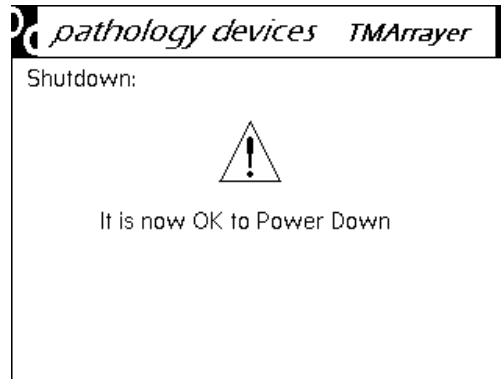


Fig. 18

**Errors:**


Any errors that reoccur after a power cycle require service.

### Array Setup:

It goes without saying that planning the array and organizing the materials ahead of time is critical to error free arrays. Once the array has been designed, tissues organized, and the regions of interest have been located for each donor, then the rest is easy.


### Detailed Operation:

The process is started by pivoting the Punch Mechanism so that the Recipient Punch is in the operating position. Now, the hole is cut by grabbing the left handle and lowering the Punch Mechanism until the physical stop is reached (the best results are obtained when the punch is allowed to slowly cut into the embedding media). The depth of the cut is determined by the adjustable stop.


 **NOTE:** This core should be as deep as possible in order to accept the longest donor core without damaging it. The best setting for this stop is when the punch is just above the plastic of a blank tissue cassette.

Once the Punch Mechanism has been lowered to the stop and held there, the punch can be rotated to assist in breaking the core free. In cases where the larger diameter punches are used, breaking free the cores is more difficult and rotation of the punch is key to ensuring the core is properly removed. The Punch Mechanism can now be withdrawn from the block and raised back to the top position where the waste core can be extruded by pushing down on the Stylus guide until it stops. The core will be extruded out of the punch and can be carefully removed and discarded and the Recipient Block is now prepared for receipt of a donor core.

Donor tissue must be cored with the Donor Punch. To start, the Punch Mechanism must be pivoted so that the Donor Punch is in the operating position. Now, you need to identify the area a core should be taken from (the area of interest). This area of interest is most often identified through microscopic visualization of an H&E stained slide, prepared from the donor tissue block, and marked.

 **NOTE:** Positioning the Donor Punch to the area of interest identified can be simplified by setting the H&E slide on top the Donor Block, positioning it to overlay the section to the tissue and lining up the mark to the punch.

When aligned, the slide is removed and the punch can be lowered, using the right handle, slowly to cut the core. Again, the Punch Mechanism should be held down in position while rotating the punch with its handle to help break the tissue core free.

 **NOTE:** There is no hard stop when coring a Donor Blocks due to the variety of sample types, cassette configurations, and sample thickness. Care must be taken to prevent damaging the punch on the cassette.

The punch can now be withdrawn to the top position and the Donor Block and support can be removed. Sometimes the core may not release from the tissue block and will remain in the block. You can check this by gently trying to extrude the donor core with the Stylus guide if no resistance is felt and no tissue presents itself from the Donor Punch then you need to try again in an adjacent area. With the larger punch diameters, this is more common but it is also much easier to see when the core has not been properly removed, and can sometimes be removed by attempting again at the same location (do not try the same location with smaller punches).

The donor core is now ready to be inserted into the prepared receptacle hole in the Recipient Block. The Punch Mechanism is now lowered all the way to a stop. At this position, the Donor Punch should be just touching the top surface of the Recipient Block. With the Punch Mechanism held in that position, the donor core is extruded by slowly pushing down on the Stylus guide until it reaches its stop.



**NOTE:** The donor Stylus stop is adjustable so that the core can be located reliably at the Recipient Block surface, or just below the surface (0.5mm is all that is needed in general).

Once deposited, the Punch Mechanism can be raised again.

Now you are ready to move to the next location on the Recipient Block and repeat the process. Movement to the next row or column position or one of the other blocks is now as easy as touching the button on the display to move up, down, left, or right. The controller will move to the next position by using your defined spacing parameter. The current row and column positions are displayed either in millimeters or row/column numbers depending on your preference. Switching between Recipient Blocks is as simple as touching the icon for the block you want to move to. All movements take place rather quickly and an animated icon will indicate when the move has been completed.

You will be capable of transferring cores in >20 seconds once you get acquainted with the operation of the TMArrayer™

**For service or technical support contact:**

Pathology Devices, Inc.  
P.O. Box 1093  
Westminster, MD 21157 USA

Phone: 410.876.5004  
email: [service@pathologydevices.com](mailto:service@pathologydevices.com)

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