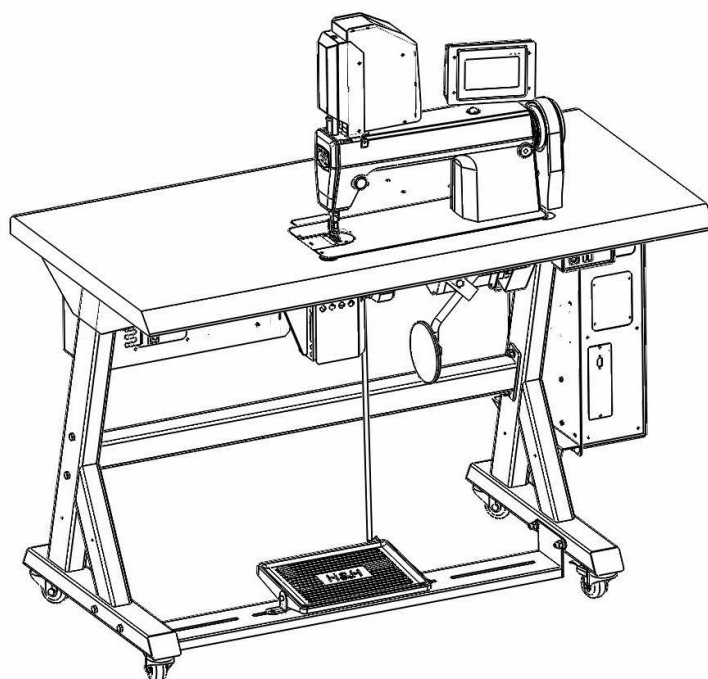


US-501 Sewfree Ultrasonic Multi-Purpose Welder

Operation Manual



is powered by

H&H Asia Group Limited

Table of Contents

Precautions Regarding to Safety

Name Plate

Introduction

Specifications

Features

Identification of Components

- Front View

- Rear View

- Power ON/OFF Switch

- Welding Head Assembly

Principle of Ultrasonic Welding

Preparation for Installation

Control Method

- Touch Screen Control Panel

- Foot Switch

- Knee Switch

- Control Menu Navigation

Start Up And Shut Down Procedures

- Start Up Procedures

- Shut Down Procedures

Basic Operation

- Control Panel Main page

- Pattern Cutting

- Cutter Pressure Adjustment

- Signal Feedback Monitoring

- Alarm Page

- Program Version

- Procedures of Basic Cutting

Table of Contents (cont.)

Maintenance

Preventative

Procedures for Replacing Parts

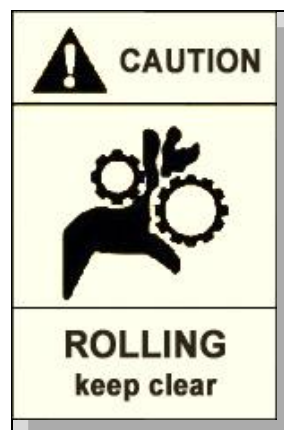
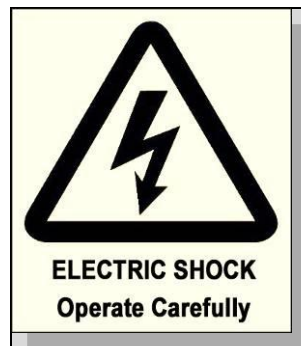
Cutter Self Calibration

Power Meter

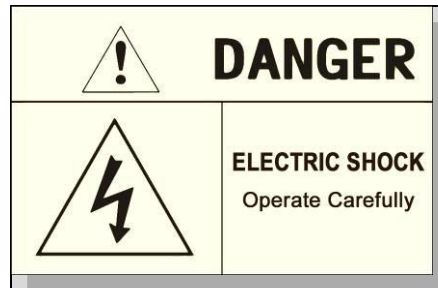
Trouble Shooting

> Precautions Regarding to Safety

Please observe these safety tips for a safe, efficient, and injury free operation of your equipment. By strictly following all instructions contained in this manual you will certainly obtain an excellent performance from the use of this equipment for many years.




> Precautions Regarding to Safety (cont.)



> Name Plate

Model : US-501			
Sewfree Ultrasonic Multi-Purpose Welder			
Voltage	Frequency	Power	Weight
220 V	50/60 Hz	700 W	120 Kg
Date :		S/N :	
H&H Asia Group Ltd.			
Room 1117, 11/F, Asia Trade Centre, 79 Lei Muk Road, Kwai Chung, N.T., Hong Kong			
Tel : (852) 2481-3068 Fax : (852) 2481-3727			
www.hh.com.hk			
MADE IN CHINA			



> Introduction

Thank you for choosing US-501 sewfree ultrasonic machine by H&H.

The US-501 Sewfree Ultrasonic Multi-purpose Welder was specially designed for cutting and welding different type of fabric. Various operations such as 'line bonding', anti-fray cutting, button hole opening can be carried out using US-501.

In order to fully understand how to use this machine properly, and avoid damage to both the machine and operating personnel, please read this manual carefully and keep it safe for future reference.

> **Specifications**

Model	:	US-501
Voltage	:	AC 220 V, single phase
Frequency	:	50/60 Hz
Power Consumption	:	700 W
Cutting Frequency	:	1-25 stroke/sec
Sonic Frequency	:	40 kHz
Horn Width	:	3 mm
Overall Dimensions	:	1.1 m (L) x 0.5 m (W) x 1.2 m (H)
Overall Weight	:	120 kg

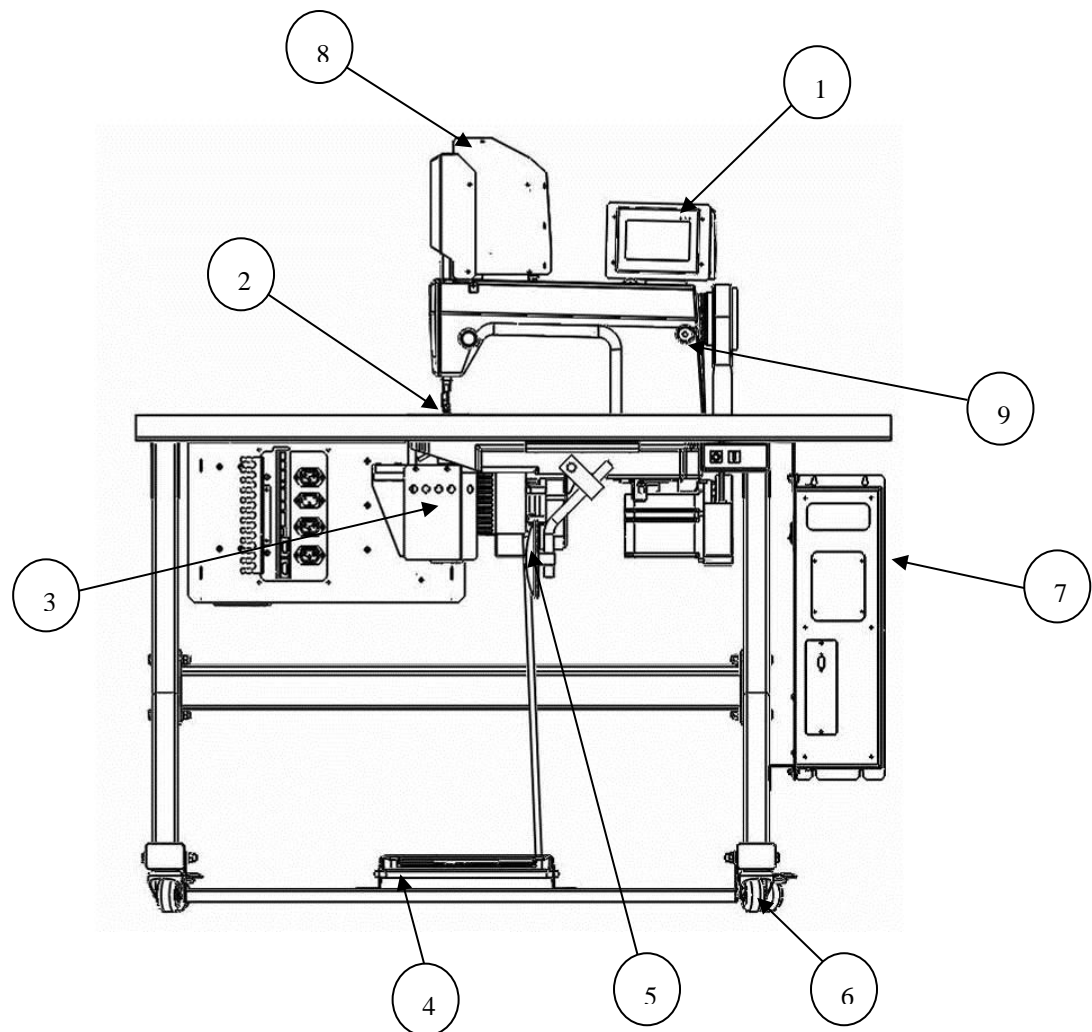
Note : due to continuous improvement, specifications are subjected to change without prior notification

> Features

- Quiet Ultrasonic System
- Microprocessor control with large panel touch screen operator interface
- Unique welding technique ensuring consistent welding energy control.
- Precise timing control resulted in no marking, over welding and skip welding during start and stop operation.
- Excellent control in constructing curved seams due to variable speed welding.
- 3D seam construction.
- Variable speed welding on the same seam without affecting welding quality
- Easy to adopt sewing machine platform
- Memory functions to store and recall operating parameters.

> Identification of Components

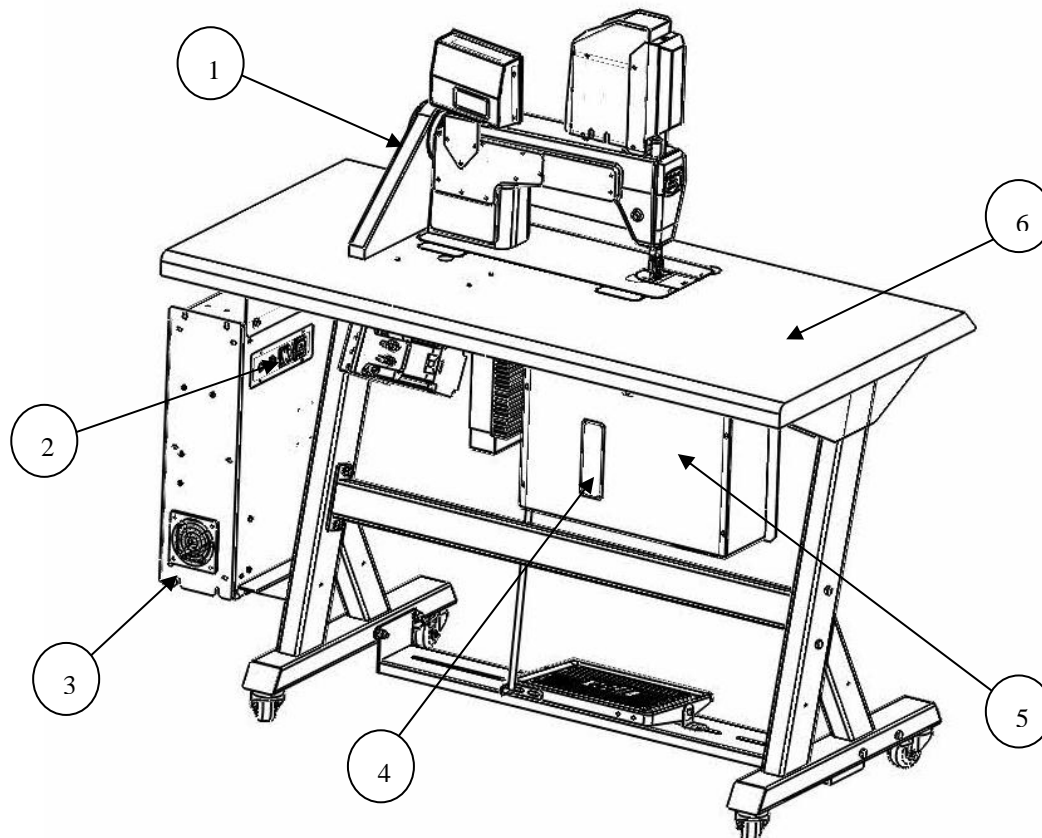
>> Front View



1. touch screen panel
2. welding head assembly
3. ultrasonic stack cover
4. foot pedal
5. knee switch
6. transporting castor
7. ultrasonic power supply
8. electronic actuator
9. sewing machine feed pitch adjusting knob

> Identification of Components (cont.)

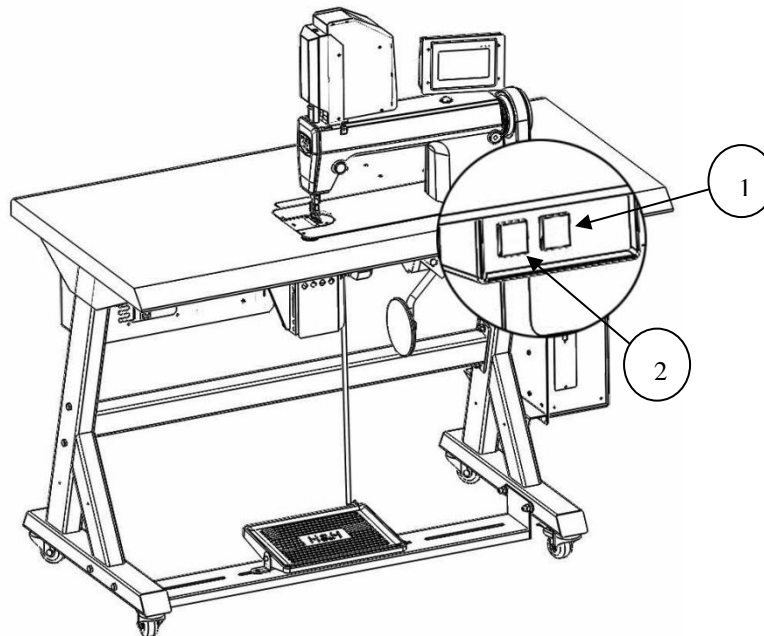
>> Rear View



1. belt shroud
2. ultrasonic power supply access panel
3. cooling fan inlet
4. circuit breaker reset access hole
5. main electrical box
6. table top

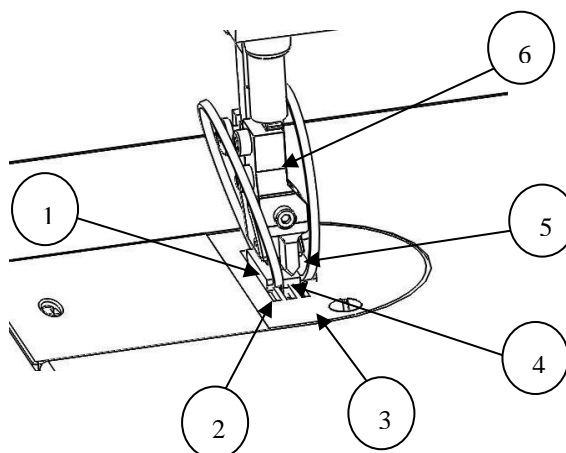
> Identification of Components (cont.)

>> Power ON/OFF switch



1. power ON button
2. power OFF button

>> Welding Head Assembly



1. press foot
2. feed dog
3. bottom utility plate
4. ultrasonic horn
5. cutter bit
6. cutter mount

> Principle of Ultrasonic Welding

Ultrasonic energy is a form of physical vibration. The commonly used vibration frequencies are 20 kHz, 30 kHz, 35 kHz and 40 kHz. Different materials exhibit different behaviors under ultrasonic vibration. Synthetic material generates internal heat under ultrasonic vibration. The US-501 machine generates vibration on the surface of the horn. Fabric with at least 50% synthetic material is placed on the surface of the horn. A special tool called cutter bit is press against the horn so that fabric between the horn and the cutter bit is exposed to vibration. The heat generated in the fabric portion under pressure is heated up instantly and the temperature is high enough to melt the fabric, hence resulting in an ultrasonic cut.

US-501 is engineered to careful manage this vibrating energy in order to slice fabric consistently in single layer or multi-layer application.

During single layer operation, fabric is melted and separated resulting in a fray free edge. While during multi-layer operation, layers of fabrics are cut but at the same time the edges of the fabric are melted and fused together resulting in a 'weld'. This process is sometimes referred as a 'cut and seal' or 'line bonding' operation.

> Preparation for Installation

Installation must be carried out by authorized personnel. Follow the steps below:

1. Position the machine on a flat surface and allow at least 50cm clearance on both sides as well as the back side, this is essential to allow enough room for carrying out necessary service and maintenance
2. Cut loose all packing cable ties and materials in order to free up all machine movements.
3. Connect the power plug to a suitable outlet with at least 15A capacity.
4. Make sure there is enough lubricate oil in the sewing machine. Oil may be drained at the time of shipping.
5. Prepare some fabric for testing
6. The machine is now ready for operation.

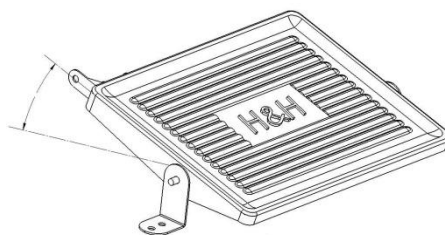
> Control Method

>> Touch Screen Control Panel

Almost all setting and timing control of the machines can be input from the touch screen control panel. Use your fingertip to touch the parameter to be modified. Switch to different pages to modify other parameters (refer to section on control menu navigation). The screen has a protective cover to prevent the surface from damage and scratch, however, avoid using excessive force when touching the panel. You can also change the contrast of the display so as to obtain the best picture when viewing at a different angle.

>> Foot Switch

The foot pedal is to control the speed of the sewing machine head. Use it in the same way as an ordinary sewing machine.

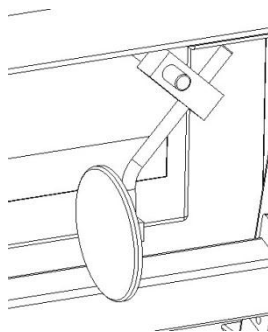


To start cutter - press forward.

To change the speed of cutting - ease back slightly from the forward position. The speed of cutting is proportional to the pedal position in the forward direction.

>> Knee Switch

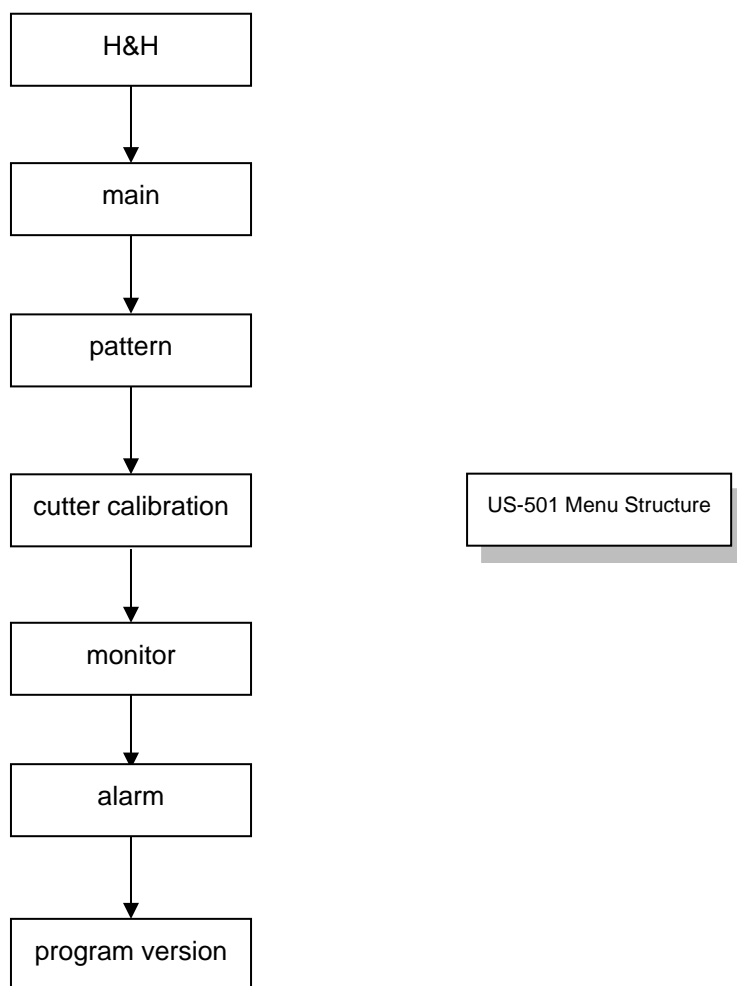
The knee switch is to lift the press foot and stamp. When the press foot is needed to be raised, apply pressure to the knee switch. The press foot is lifted mechanically while the stamp is lifted up electronically. Release the knee switch to lower the press foot and the stamp.



> Control Method (cont.)

>> Control Menu Navigation

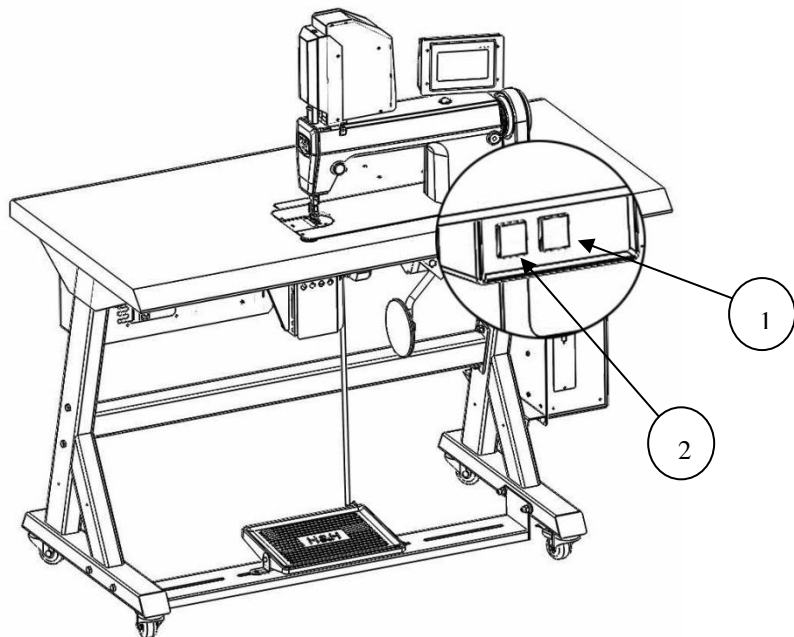
The US-501 has a number of parameters that can be adjusted according to the operational situations. These parameters are arranged in different menu pages on the touch screen control panel according to their functionality. The structure of the menu page arrangement is represented in the following diagram.



> Start Up and Shut Down Procedures

Please take steps to follow the procedures described below:

Location of power ON/OFF switch



- 1 power ON button
- 2 power OFF button

>> Start up Procedures

Turn on the machine by pressing the green power ON button

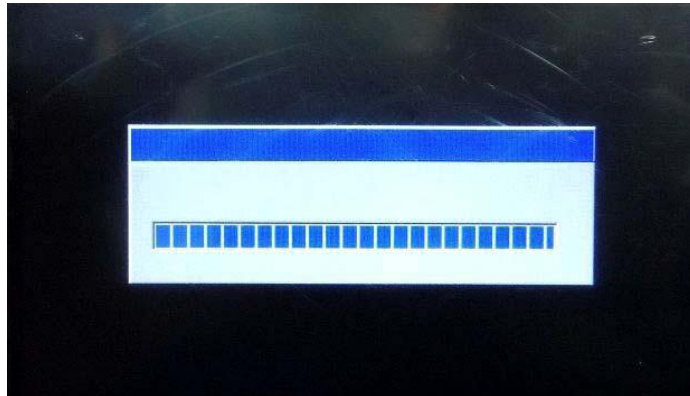
The 1st page is welcome note will show once the machine is powered on.



> Start Up and Shut Down Procedures (cont.)

>> Start up Procedures (cont.)

The 2nd page is program loading page, it will process for several seconds and carry to the **main** page.



Briefly after the power is turned on, the electronic positioning system will direct the stamp to predefined position called home position. The stamp will use this position as a reference for all future movement. At the home position, the positioning system has a coordinate equal to '0'. During the homing process, do not interfere with the motion of the stamp as the machine may pick up incorrect data resulting in incorrect position in the subsequence operation.

>> Shut down Procedures

WARNING !

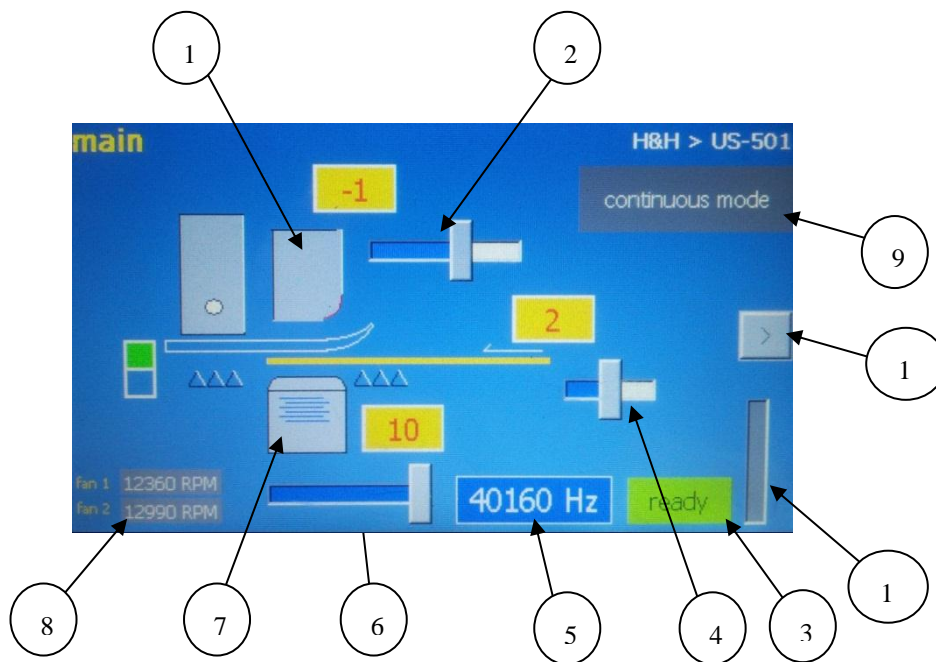
Please follow the shut down procedures strictly to avoid damage to the ultrasonic system.

- 1 Always allow at least 5 seconds idle before turning off the power.
- 2 Always allow at least 5 seconds after the shut down before turning on the machine again.
- 3 Turn off the machine by pressing the red power OFF button

> Basic Operation

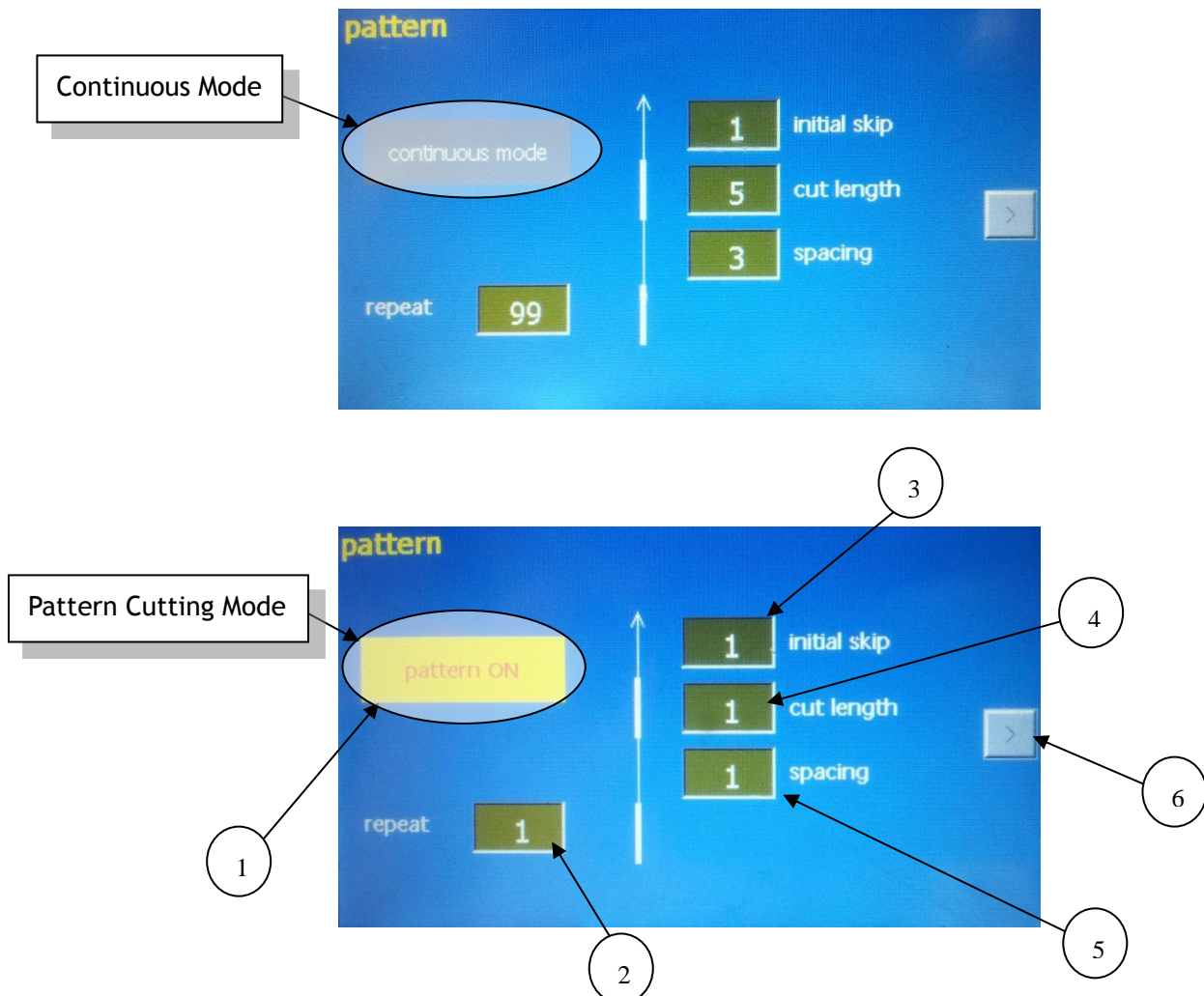
>> Control Panel Main page

Going into the operation main page. Basic parameters are needed to be set before operating the machine. Refer to the corresponding sections for detail explanation.



- 1 cutter assembly
- 2 cutter pressure regulator (the number is the real time pressure, selecting range is -10 to +5)
- 3 sonic on/off switch, ready is sonic power on while off is sonic power off
- 4 cloth thickness selector (the number is the real time relevant speed, selecting range is 0 to 4) ^{R1}
- 5 sonic on/off switch, ready is sonic power on while off is sonic power off
- 6 sonic frequency
- 7 sonic power regulator (the number is the real time power, selecting range is 1 to 10)
- 8 sonic cooling fan speed
- 9 cutter operation mode indicator (continuous working mode or pattern on processing mode)
- 10 to next page
- 11 sonic power consumption indicator

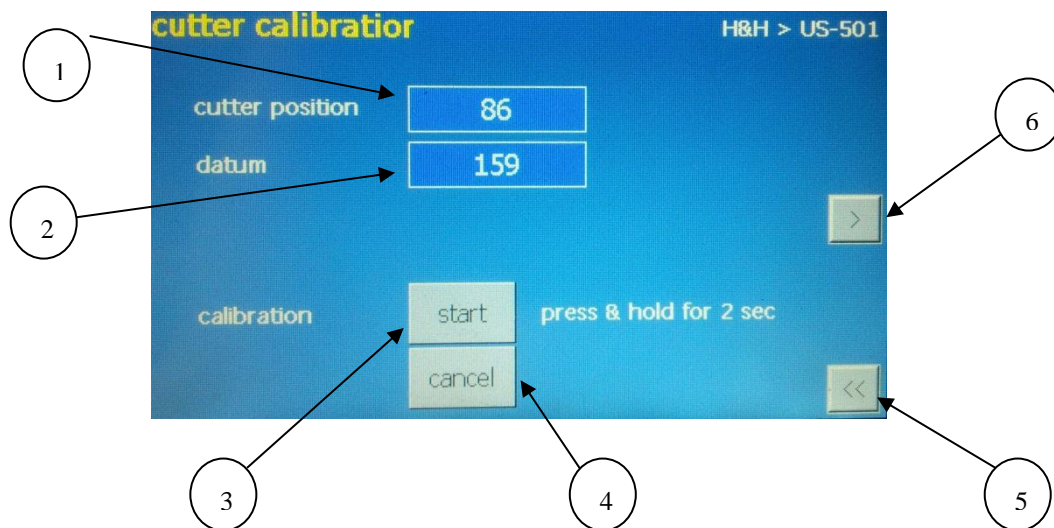
R1: Thicker cloth will be more difficult to cut, a slower speed will be more appropriate; conversely, thinner cloth will be easier to cut, can apply with a faster speed

> **Basic Operation (cont.)**>> **Pattern Cutting**

- 1 press here to select the machine for normal or pattern cutting mode (default for continuous cutting) R2
- 2 it is for setting the pattern cut repetition times (1=1 needle pitch, range 1 to 100)
- 3 it is for setting the initial spacing skip steps prior for the first cut (1=1 needle pitch, range 1 to 100)
- 4 setting the pattern cutting length steps (1=1 needle pitch, range 1 to 100)
- 5 setting the pattern cut slot spacing steps (1=1 needle pitch, range 1 to 100)
- 6 to next page

Using different pattern cutter to achieve different pattern (standard pattern cannot bigger than 3mm x 2mm). Adjusting the pressure between the cutter & the sonic horn can also achieve different welding & cutting point. Application for pattern cutting including decoration and sewfree button holes.

R2: When the machine is selected to the pattern cutting mode, it will stop when the set cycles are finished and ready for the next cycle start up.

> **Basic Operation** (cont.)>> **Cutter Calibration**

- 1 cutter real position
- 2 cutter position regulator
- 3 cutter auto calibration switch R3
- 4 cutter auto calibration cancel R3
- 5 back to "main" page
- 6 to next page

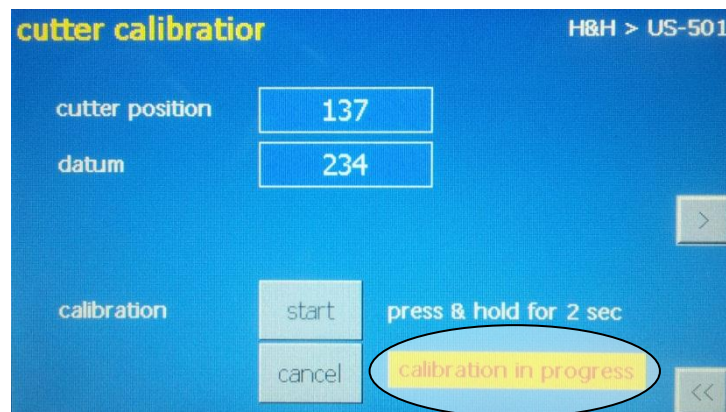
R3: After operating with a period of time, the cutter will wear, the gap between the cutter and the sonic horn will need to readjust.

R4: If there is any problem when it is going through the self-calibration process, you can press the "cancel" button to cancel the self-calibration process and readjusting the position of the cutter again.

> **Basic Operation** (cont.)

>> **Cutter Calibration** (cont.)

After press the #3 button and hold for 2 seconds, the machine itself will go through a “self-calibration” process and an alarm of “calibration in process” will flashing. Keep clear around the horn & cutter.



After the alarm of “calibration in process” is disappeared, the self-calibration process is completed and the machine will get back to the home ready position.

> Basic Operation (cont.)

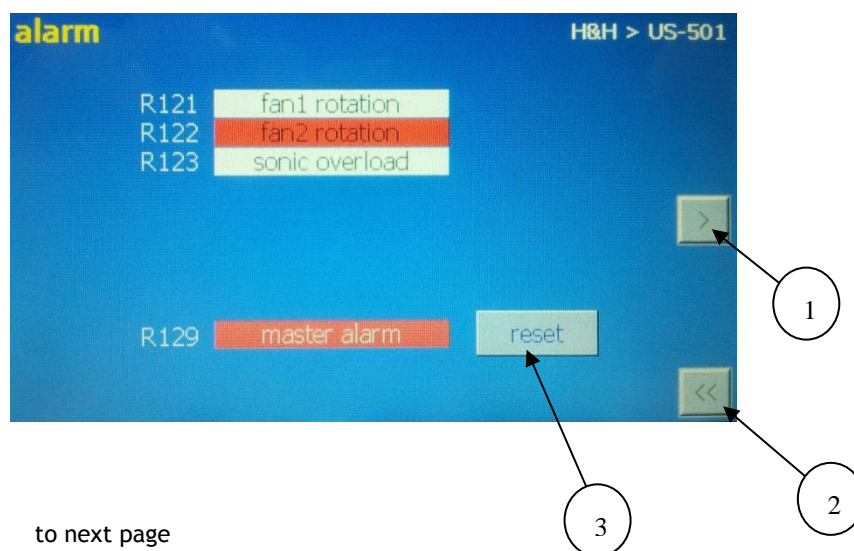
>>Signal Feedback Monitoring

It is listed all the feedback information of the sensors in this page



- 1 to next page
- 2 back to "main" page

>> Alarm Page

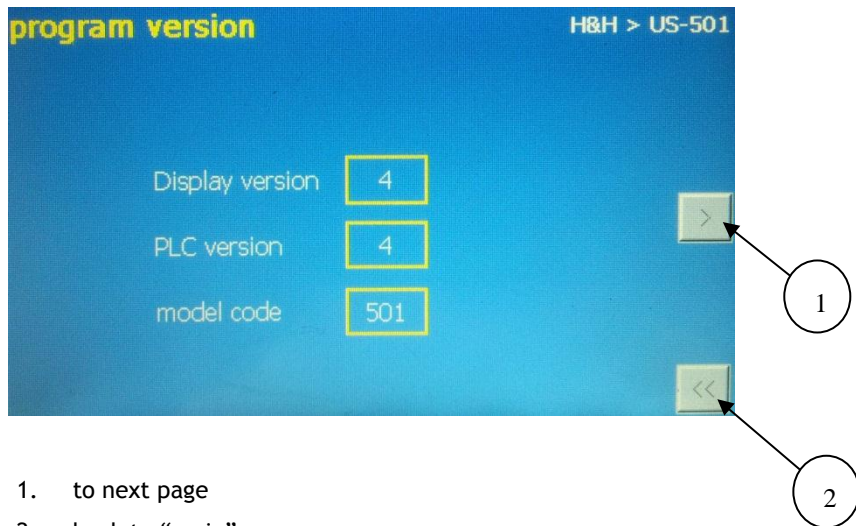


- 1 to next page
- 2 back to "main" page
- 3 reset the alarm

If either fan of the sonic assembly or the sonic power overload is at fault, an alarm regards to that will go red at the "alarm" page. You can reset the alarm if the problem is fixed.

> **Basic Operation** (cont.)

>>Program Version



1. to next page
2. back to "main" page

It is the end of this software version, press #1 or #2 button will back to the main page.

> **Basic Operation** (cont.)>> **Procedures of Basic Cutting**

- 1 Set the sonic power to setting '8', pressure to '2'. This should be a fair setting to start with.
- 2 Raise the press foot by pressing on the knee switch and hold.
- 3 Position a piece of fabric so that the edge of the fabric is just under the cutter bit
- 4 Lower the press foot to secure the fabrics by releasing the knee switch.
- 5 Step on the foot pedal to start cutting, the fabric will be fed according to position of the foot pedal and the feed pitch setting of the sewing machine. While cutting, avoid sudden change of foot pedal position and avoid shifting the fabric side way or otherwise there may not have a continuous cut.
- 6 During cutting, steers the fabric gently to make curves. At the end of the cut, release the foot pedal.
- 7 Raise the press foot by pressing on the knee switch.
- 8 The first ultrasonic cut is finished.
- 9 Resume operation with the above procedures for the next cut.

WARNING !

Avoid operating the machine without the fabric in order to minimize the wearing to the cutter bit and the horn face.

> **Maintenance**>> **Preventative**

In order to keep the machine in top running condition, regular maintenance is important for trouble free operation. This will minimize possible down time and to prolong machine life.

Daily

- Check the motion of the machine for smoothness and strange noise, especially high pitch noise from the ultrasonic system
- Check all cooling fans are running especially the cooling fans of the ultrasonic horn.
- Check the oil inspection window to make sure that lubrication to the sewing machine is adequate, add oil if needed.
- Observe the power meter for exceptionally high reading

Weekly

- Check the horn face for unusual groove or excessive wearing
- Visually inspect all the electrical and mechanical parts for abnormal burns and looseness.

In Case

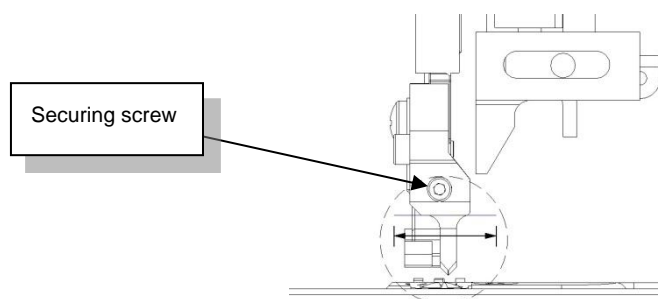
- If unusual rough edges or repeat pattern appear on the cut edge, check the cutting bit for damage.
- If the cutting edge is perforated, check for stamp alignment

> **Maintenance** (cont.)

>> **Procedures for Replacing Parts**

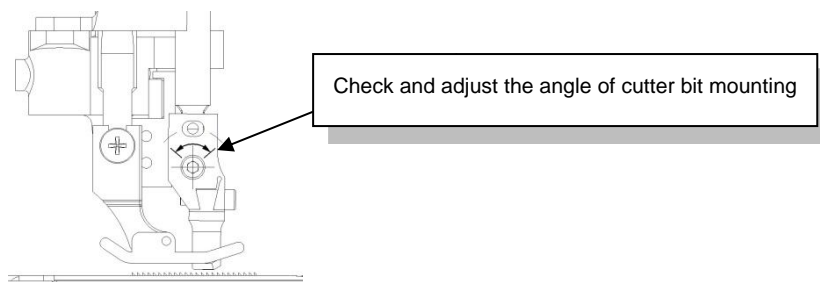
Cutter bit

Turn off the machine. Unscrew the securing screw and tap out the cutter bit from the side. Replace another cutter bit. The bit is designed to be able to move from left to right in a range of about 5 mm. Adjust the position of the cutter bit so that the bit will land on the proper position of the horn face. You can manually push the cutter down to touch the surface of the horn in order to check the position. Tighten the securing screw. Recheck the cutter bit so that the contact portion all lands within the center part of the horn face, away from the edge of the horn. This is essential to avoid excessive wear to the horn.



After replaced a new bit, always check the alignment between the cutting edge of the bit and the horn face. The entire cutting edge should be in full contact with the horn face when observed from the side, this is extreme important for the machine to cut properly. You will need to manually push down the cutter so that the cutting edge and horn face is just in contact. A torch can be placed on the opposite side of the cutter so that the line of contact can be inspected.

When you replace the bit only, normally you do not need to re-adjust the angle of alignment provided that the cutter bit mount was previously adjusted correctly and did not come loose. However, if the line of contact is not even, then re-adjusting this angle is necessary.



> Maintenance (cont.)

>> Procedures for Replacing Parts (cont.)

Cutter bit (cont.)

Loose the 2 securing screws slightly so that the mount can be pivoted. Push the cutter down so that the cutting edge will be in contact with the horn face. Pivot the mount slightly so that the contacting area will be a line rather than a point. Tighten the securing screws. Recheck the contacting area again so that the mount did not move during tightening.

After the cutter bit is replaced, the self calibration (described in the next section) **MUST** be performed before operating the machine.

WARNING !

Failure to calibrate the cutter may cause damage to the horn face and/or cutter bit.

Ultrasonic component

All ultrasonic components are calibrated to match each other as the correct frequency is critical to the proper machine operation. There are no user serviceable parts in the system including the power board and the ultrasonic stack, horns, etc. All parts replacement should be done by authorized technician or send back to the factory. Do not attempt to hammer, dismantle or unscrew the parts with consulting H&H as the ultrasonic stack contains fragile component that could be damaged easily.

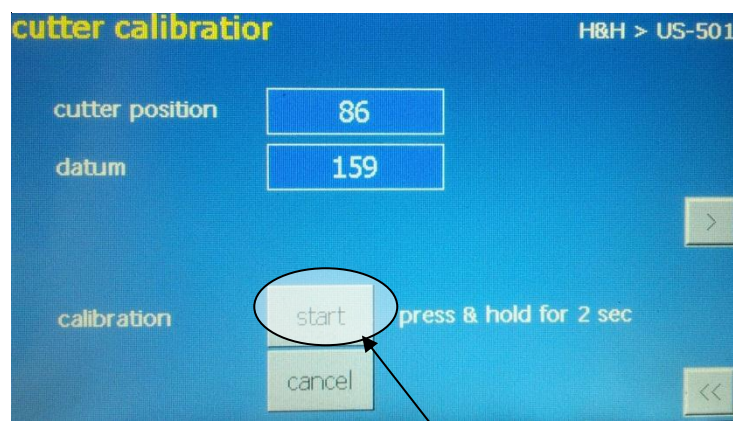
> Maintenance (cont.)

>> **Cutter Self Calibration**

Whenever a new cutter bit is installed or other related parts are serviced, due to slight dimensional variation, the depth of the cutting may have changed. Hence, the machine must be re-calibrated before the machine can be operated properly.

Check list before the self calibration

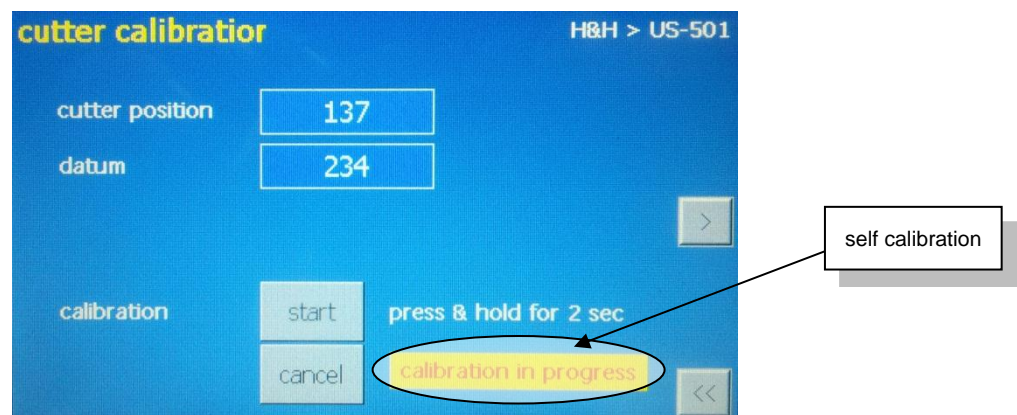
1. The ultrasonic system is in the 'ready' status
2. The cutter bit is securely installed
3. The cutting edge is aligned properly with the surface of the horn
4. There is no foreign material such as fabric between the horn face and the cutting bit



Press and hold for 2 seconds to enter the self calibration mode

> **Maintenance (cont.)**>> **Cutter Self Calibration (cont.)**To initialize self calibration

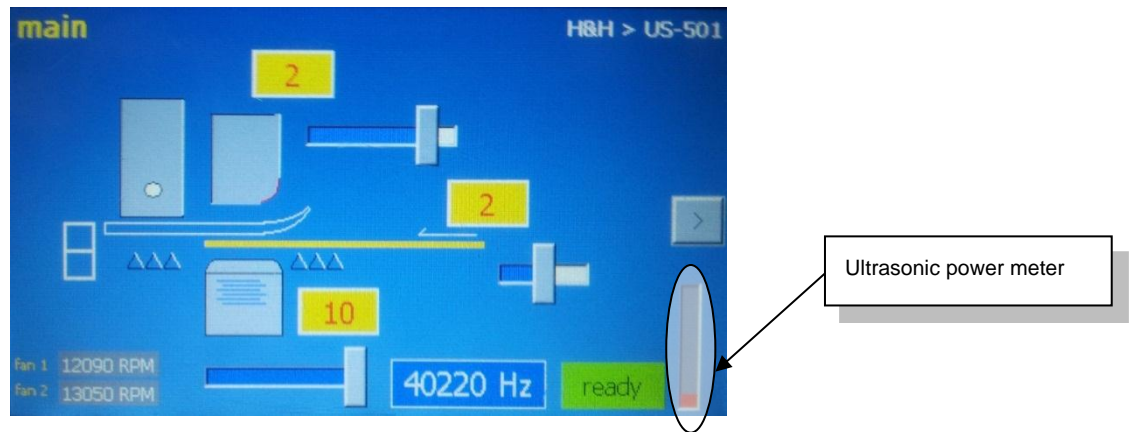
1. Press and hold the self calibration button for 2 seconds to initialize the self calibration sequence.
2. The actuator system will slowly move the cutter toward the horn face.
3. At the same time, a pop up screen will appear indicating the status of the self checking



4. Do not interfere with the machine during this time including touch screen, switches, etc.
5. A noise may appear briefly when the cutter is touching the horn face, this is normal
6. When the calibration is finished, the pop up screen will disappear and the calibration is finished. The cutter bit will be retracted to the standby position.

> Maintenance (cont.)

>> Power Meter



There is a power meter on the page 'main' to monitor the ultrasonic power consumed by the system. The pointer inside will move up and down according to the power reading. The upper the pointer, the higher of the power is consuming.

During idle, this pointer should stay low as the system is not consuming significant power at this time. When the machine start to cut, the pointer will be floating somewhere in the middle to reflect the power consumption using for the cutting. Power consumption is depending on the power setting, the cutter force and the fabric thickness, therefore, the pointer will float to different height from time to time.

Always pay attention to this meter during operation. An ultrasonic problem can be spotted earlier if the level of the pointer is located higher than the normal position compares with the past.

> **Trouble Shooting**

Problem	cause	Solution
No power in some places	Power cable or plug faulty	Check the power supply connection
	Circuit breaker tripped	Reset circuit breaker and investigate the cause
	Main power switch not turned on	Press the power ON button (start)
	Bad connection	Check all wires for loose connection
	Faulty transformer	Check the voltage of switching power supply
Fabric not feeding	Press foot is in the UP position	Press and release the knee switch to lower the press foot
	Sonics status is not in READY mode	Turn OFF the power and then ON to reset
	Sonics is turned off	Press the sonic enable button to ON
Weld strength is poor	Sonics power is too low	Increase power slightly and try
	Improper cutting bit used	Refer to H&H for proper cutter bit for particular fabric
	Feed step is too large	Decrease feed pitch of the sewing machine
	Stamp pressure is too low	Increase the stamp force slightly at a time
Sonic overload	Horn is cracked	Replace horn
	Screw in horn is broken	Replace with a new screw
	Faulty ultrasonic power supply	Inspect by an authorized personnel
High pitch noise is heard	Horn touching neighboring component	Re-adjust position to isolated horn
	Ultrasonic mounting loose	Re-tighten all screws