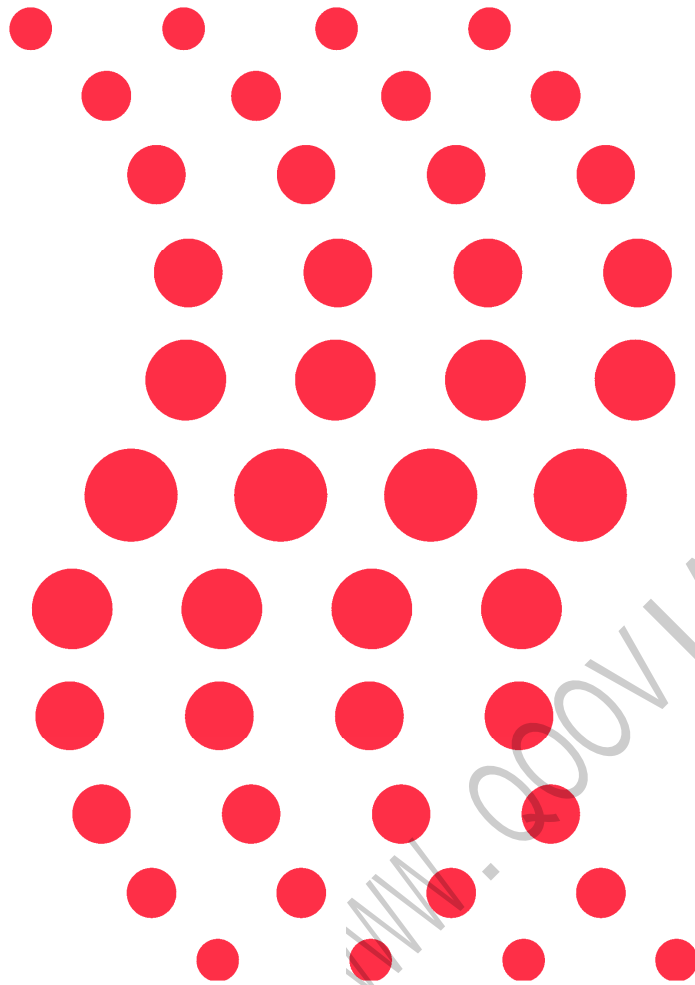




SONICS

Sonics & Materials, Inc.



~~X~~-Press

*Integrated  
Welder*

I N S T R U C T I O N M A N U A L

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# WARNING



## **SAFETY PRECAUTIONS READ BEFORE INSTALLING OR USING THE EQUIPMENT**

Our systems have been designed to assure maximum operator safety. However, no design can completely protect against improper usage. For maximum safety and equipment protection, observe the following warnings at all times and read all applicable instruction manuals carefully before you attempt to operate any equipment.

- The equipment has safety devices that require both hands to be on the palm buttons until the horn contacts the work piece. Do not defeat or modify these safety devices.
- Do not use with foot switch or other means of actuation unless alternate means of pinch-point protection is provided.
- High voltage is present in the equipment. Disconnect plug before removing cover or servicing.
- Make sure equipment is properly grounded with a 3-prong plug. Before plugging in equipment, test outlet for proper earth grounding.
- High voltage potential may be present in the converter as a result of temperature changes. Do not touch the converter contact unless you first short both pins or the button to the converter case with an insulated tool.
- Never squeeze or grab a vibrating horn.
- Do not modify horn configurations.
- 20 kHz ultrasonic welders operate above normal audibility for most people. Ear protection is recommended.
- Do not affix any device to any portion of the horn.



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INSTRUCTION MANUAL • MODEL X-PRESS

1

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# IMPORTANT SERVICE LITERATURE

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**NOTE:** Please read carefully before operating the equipment, then forward to your service department.

The system supplied with this instruction manual is constructed of the finest material and the workmanship meets the highest manufacturing standards. It has been thoroughly tested and inspected before leaving the factory and when used in accordance with the procedures outlined in this manual, will provide you with many years of safe and dependable service.

## MANUAL CHANGE INFORMATION

We continually strive to be at the forefront of the latest electronic developments by adding circuit and component improvements to our equipment as soon as they are developed and tested.

Sometimes, due to printing and shipping requirements, we cannot incorporate these changes immediately into printed manuals. Hence, your manual may contain new change information. Change information, if any, is located in the Appendix.

We reserve the right to make any changes in the design or construction of our equipment at any time, without incurring any obligation to make any change whatsoever in units previously delivered.

The technical data and schematics in the manual are for informational purposes only and may not reflect the current configuration being shipped from our factory. Upon formal request, complete and up-to-date information can be provided from the factory free of charge.



**SONICS** .....

# UNPACKING AND INSPECTION



**NOTE:** We recommend keeping all carton(s) and packing material in case it might be necessary to move the equipment, or to ship it for repair.

Before unpacking the equipment, check the shipping carton for any visible damage. If you see any, be sure to follow the procedures described below under “Visible Loss or Damage.” Otherwise, proceed to remove the equipment from the carton. Before disposing of any packing material, check it carefully for small parts. Then perform a visual inspection of the equipment to detect any evidence of damage which might have occurred during shipment. Check the following:

1. all components against the enclosed packing list,
2. all module plug-in units,
3. all wire plug-in connections.

The equipment was carefully packed and thoroughly inspected before leaving our factory. All units are tested and checked for problems prior to shipping. It is asked that when a problem does occur that all parts and components be inspected for damage (especially when the unit is not in working order when received). Responsibility for safe delivery was assumed by the carrier upon acceptance of the shipment. Claims for loss of damage sustained in transit must therefore be made upon the carrier, as follows:

## **VISIBLE LOSS OR DAMAGE**

Any external evidence of loss or damage must be noted on the freight bill or express receipt, and signed by the carrier’s agent. Failure to adequately describe such external evidence of loss or damage may result in the carrier’s refusal to honor a damage claim. The form required to file such a claim will be supplied by the carrier.

## **CONCEALED LOSS OR DAMAGE**

Concealed loss or damage means loss or damage which does not become apparent until the merchandise has been unpacked. The contents might have been damaged in transit due to rough handling even though the container may not show external damage. When the damage is discovered upon unpacking, make a written request for inspection by the carrier’s agent within 48 hours of the delivery date. Then file a claim with the carrier since such damage is the carrier’s responsibility. The form required to file such a claim will be supplied by the carrier. Do not destroy packing materials, or move material from one location to another before the carrier makes their inspection.

If the system or any unit is damaged, notify “Sonics.” “Sonics” will arrange for repair or replacement of damaged equipment without waiting for the claim against the carrier to be settled, provided a new purchase order is issued to cover the repair or replacement costs. Should any damage, shortage or discrepancy exist, please notify us immediately.

# INTRODUCTION

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The X-Press integrated welders, models XPT and XPE, are 20 kHz ultrasonic benchtop presses with built-in microprocessor-controlled power supplies.

## OVERVIEW OF ULTRASONIC PLASTICS ASSEMBLY

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### **WHAT IS ULTRASONICS?**

Ultrasonics refers to vibrational waves with a frequency above the human audible range which is usually above 18,000 cycles per second (Hz).

### **PRINCIPLE OF ULTRASONIC ASSEMBLY**

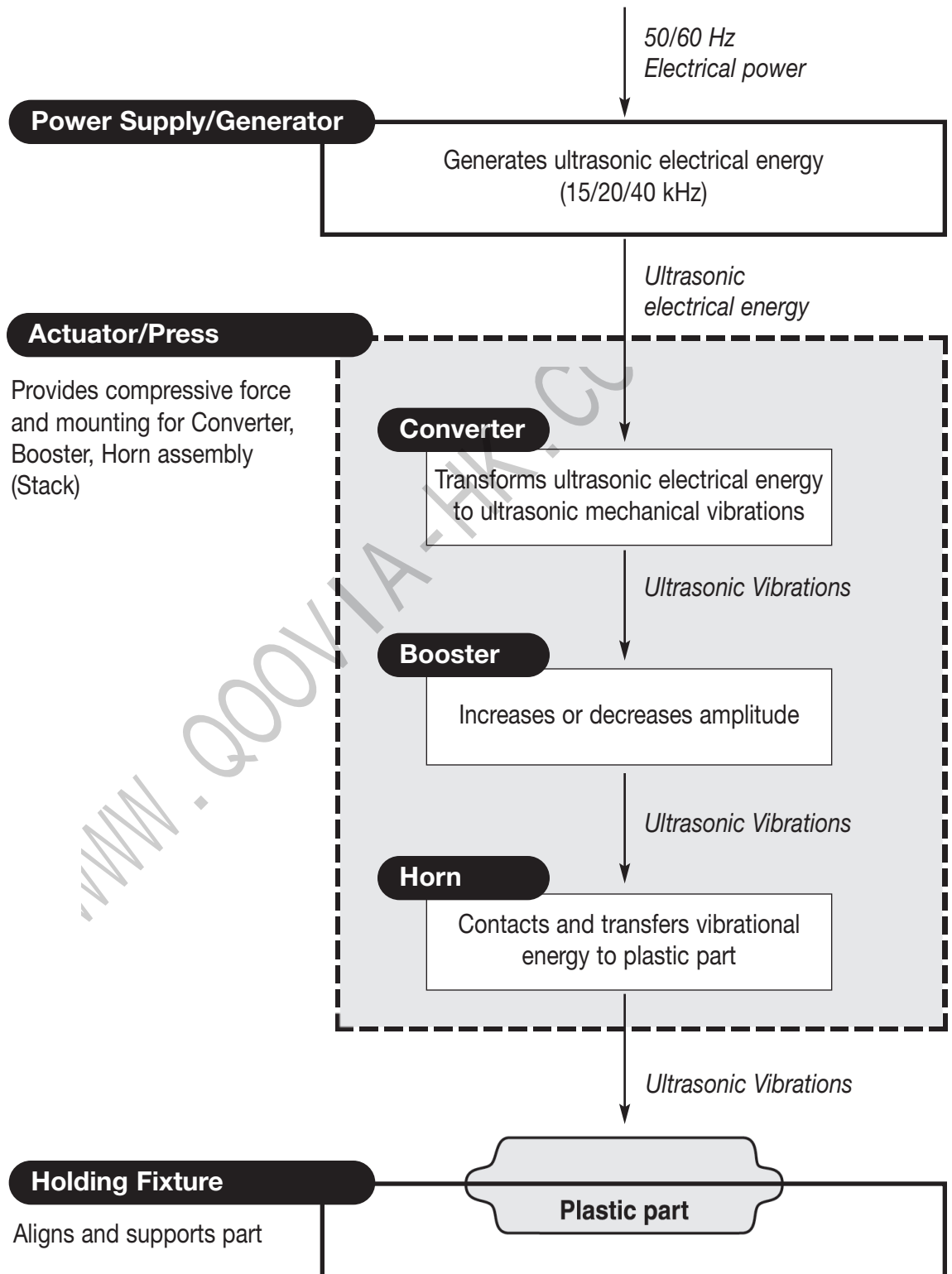
The basic principle of ultrasonic assembly involves conversion of high frequency electrical energy to high frequency mechanical energy in the form of reciprocating vertical motion which, when applied to a thermoplastic, generates frictional heat at the plastic/plastic or plastic/metal interface. In ultrasonic welding, this frictional heat melts the plastic, allowing the two surfaces to fuse together; in ultrasonic staking or insertion, the controlled flow of molten plastic is used to capture or lock another material in place (staking) or encapsulate a metal insert (insertion).

### **ULTRASONIC ASSEMBLY SYSTEMS**

“Sonics” ultrasonic assembly systems are generally composed of the following major elements: a power supply, converter, booster, horn, pneumatic press/actuator and holding fixture, as detailed in the diagram on the next page. A review of this diagram will help you understand the basic elements involved in the assembly process and their relation to each other.



**“SONICS” ULTRASONIC ASSEMBLY SYSTEMS**





# GLOSSARY OF ULTRASONIC TERMS

---

**POWER SUPPLY/GENERATOR** – The built-in solid state power supply converts standard 50/60 Hz electrical power to 20,000 Hz electrical energy (20 kHz).

**ACTUATOR/PRESS** – The pneumatic actuator provides compressive force and mounting for the converter, booster, and horn assembly. The benchtop press consists of a base assembly, column and actuator (head).

**CONVERTER** – The converter changes the high frequency electrical energy supplied by the power supply to high frequency mechanical vibrations.

**BOOSTER** – Successful ultrasonic welding often depends on having the right amplitude at the horn face. Often it is not possible to design a horn which has both the necessary shape and required gain (ratios of input amplitude to output amplitude). Therefore, a booster is placed between the converter and the horn to either increase or decrease the amplitude of the horn. In addition to changing/maintaining the amplitude, the booster provides support and alignment in the welding system. (See page 27 for booster selection.)

**HORN** – The horn is a tuned component of the system which comes in contact with the parts to be assembled. The horn 1) transfers the ultrasonic vibrations produced from the converter to the parts being welded, and 2) applies necessary force to the assembly while the material resolidifies.

**HOLDING FIXTURE** – The holding fixture or nest assures proper alignment and support of the parts being assembled.



# INSTALLATION



## WARNING

The line cord is equipped with a 3-prong, grounding plug. Do not, under any circumstances, remove the ground prong. The plug must be plugged into a mating 3-prong, grounding type outlet.



## WARNING

Do not connect the press to an air source supplied by a compressor lubricated with synthetic oils or oils containing phosphate esters or chlorinated hydrocarbons. This type of lubricant may cause the air filter to malfunction, and the plastic bowl to rupture.

## ELECTRICAL POWER REQUIREMENTS

The press requires a fused, single-phase, standard 3-terminal grounding type receptacle capable of supplying the requisite voltage and current. Refer to the table below for power specification.

### POWER SPECIFICATIONS

| Model  | Power Rating | 115 vac | 230 vac |
|--------|--------------|---------|---------|
| XP1200 | 1200w        | 20 amps | 10 amps |
| XP2200 | 2200w        | N/A     | 20 amps |

## AIR SUPPLY

The press requires a source of dry, filtered (5 micron), oil-free, compressed air capable of supplying a constant line pressure of 85 psig. (586 kPa / 6 bar) at a minimum capacity of 2 CFM.

## SETTING UP

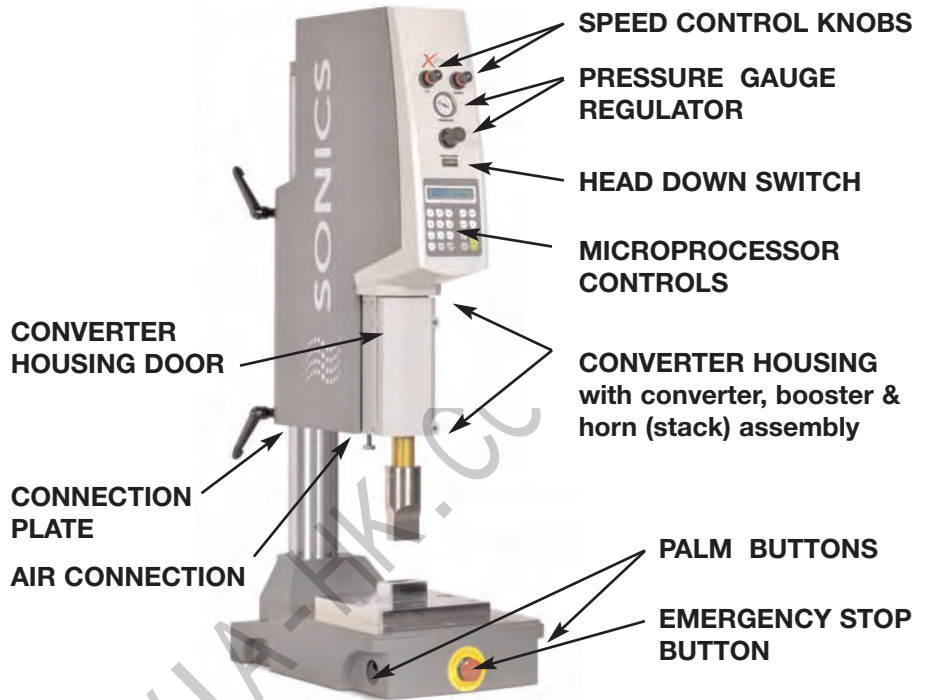
The press should be installed in a clear, uncluttered location that is free from excessive dirt, dust, corrosive fumes, and temperature and humidity extremes. The selected installation site should be near the electrical power and air supply sources and away from any equipment that generates abnormally high electrical transients. Observe the following additional instructions when installing the press:

- The press should be placed on a sturdy, level table or bench capable of supporting a minimum of 500 pounds (227 kg).
- Do not place anything on top of the press. The ventilation grille should not be covered by any items. Periodically check the grille and clean as necessary.



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## KEY COMPONENTS

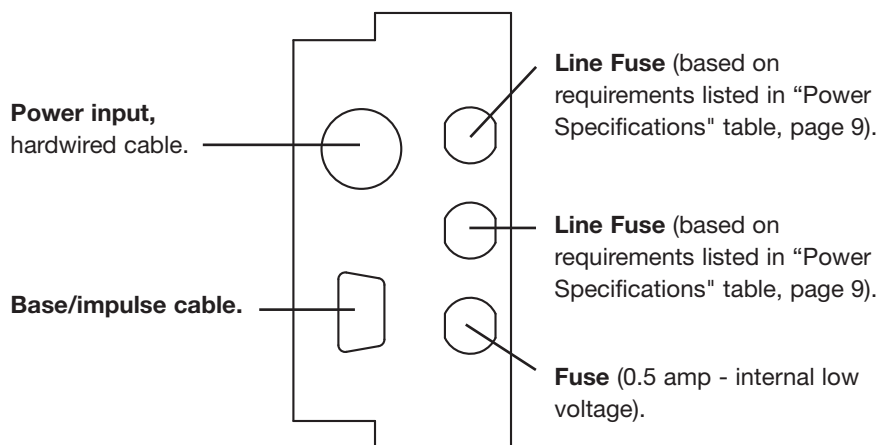


## CONNECTIONS



**NOTE:** Do not strain or kink cables. When going around corners, allow as wide a bend as possible. Do not run cables parallel to any power line within a distance of less than 1 foot (304.8mm).

When making initial air supply or impulse cable connections, make sure all electrical power is disconnected. Located on the connection plate at the base of the press head are the following:



1. Connect the air supply source to the press air hose.

2. If you are using an impulse cable, connect it as noted above (disconnect the base cable if necessary). Refer to the Impulse Cable drawing in the Appendix, page 36.
3. When the above connections are secure, the power line cord can be plugged into an appropriate electrical outlet.
4. To prevent the possibility of an electrical shock, ensure that the power supply line cord is properly grounded. Also make sure that the voltage rating of the electrical power source matches the press power requirement (refer to the “Power Specifications” table on page 9).
5. Check with your electrician if you have any wiring questions.

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# OPERATING PROCEDURES

## CONTROL PANEL

Located above the converter housing on the X-Press are the following controls:



### WARNING

*Excessive velocity may be unnecessary and harmful to the system.*

1. **SPEED CONTROL** knobs allow regulation of the velocity at which the horn descends and returns (stroke speed). These controls are factory adjusted for average operating conditions. When minor adjustments are necessary, be sure to adjust in small degrees. Pull the red ring out to release and push in to lock setting.

The left knob, labeled "UP," controls the return speed - turn the knob clockwise to slow the speed, counterclockwise to increase speed. The right knob, labeled "DOWN," controls the descending speed - turn the knob clockwise to slow the speed, counterclockwise to increase speed.

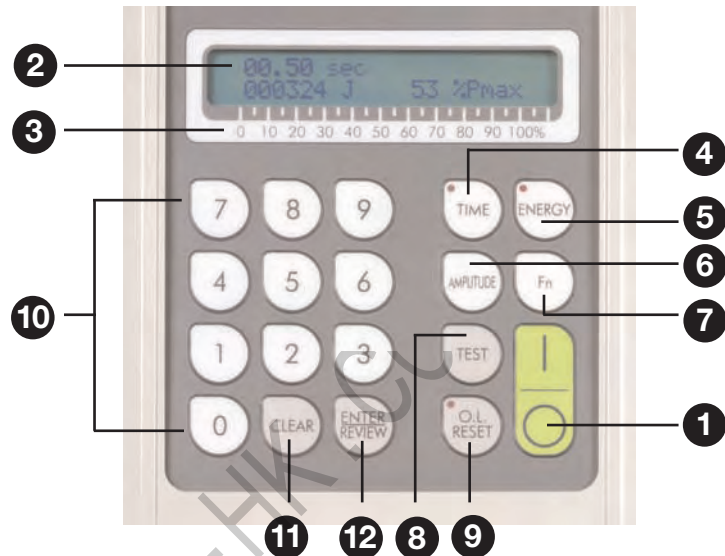
2. **PRESSURE REGULATOR** with corresponding gauge that allows regulation of the (air) pressure with which the horn contacts the part(s). Pull the knob to make adjustments, and then push in to lock setting when desired pressure is displayed on the gauge. Once pulled, turning the knob clockwise increases pressure, and turning it counterclockwise decreases pressure.

3. **HEAD DOWN** switch. Depressing the Head Down switch and then the left Palm button allows the head to move down under gauge pressure. When the pressure switch closes, the display will show the message "HD LATCHED." Release the Head Down switch and the left Palm button and the head will remain in the down position. To retract the head, press the right Palm button. The Head Down switch is for set-up purposes only - these actions do not cause ultrasonics to be activated.

# OPERATING PROCEDURES

## MICROPROCESSOR CONTROLS AND INDICATORS

Located at the front of the press are the following controls and indicators:



1. **ON/OFF** keys which turn the unit on and off.
2. **LCD SCREEN** which displays various settings, parameters and prompts as detailed in the following pages. In addition, during the weld process it displays a load meter indicator showing the power level of ultrasonics that is being delivered to the welding press (see #3 below).
3. **LOAD METER SCALE** from 0 to 100% which (in conjunction with vertical line indicators on LCD display) shows the running power (bar graph at bottom of display) and peak power (single vertical line at top of display) during the weld. Peak power is reported as %Pmax after the cycle (see page 16).
4. **TIME** key which allows selection and display of time settings and permits adjustment of time duration in .01 second increments (from 00.00 to 99.99 seconds) for six time parameters as follows:
  - a. Weld time
  - b. Hold Time
  - c. Delay time
  - d. Afterburst Time
  - e. Time Limit Low
  - f. Time Limit High

*For a complete explanation of these parameters, refer to page 18.*

5. **ENERGY** key (active on XPE models only) which allows selection and display of the following energy settings and permits adjustment of the energy parameters a. through c. below in 1 joule increments (from 0 to 999,999 joules):
  - a. Energy Setting
  - b. Energy Limit Low
  - c. Energy Limit High

*For a complete explanation of these parameters, refer to page 19.*

6. **AMPLITUDE** key which controls adjustment of the amplitude setting, relating to the system's high-frequency vibrations over the full operating range. Refer to page 19 for more information. (Major adjustments of amplitude can be made through the use of different boosters – see page 27.)
7. **FN** KEY. Option not available on this model.
8. **TEST** key which can be used to test ultrasonic operation and displays idle losses of converter/booster/horn as a percentage of maximum power when key is depressed. Also functions as a frequency display. Refer to page 16 for more detailed information.
9. **O.L. RESET** key which resets the power supply following an overload condition. Red LED in upper left corner indicates an overload condition exists. Refer to page 20 for complete information.
10. **0-9 NUMERIC KEY PAD** which allows input of numeric data or numeric selection options by pressing the keys.
11. **CLEAR** key which cancels a prior parameter value when a new value is to be entered.
12. **ENTER/REVIEW** key which Enters data into the system as keyed in with the numerical keys and displayed on the LCD screen. In Review function, displays the alarm, mode and cycle information.



## KEYING IN PARAMETERS

To make numeric entries into a cursor location that is displayed on a screen menu, use the numeric keypad. When the desired entry is displayed on the LCD screen, use the ENTER key to register the new value. Entries are made left to right.

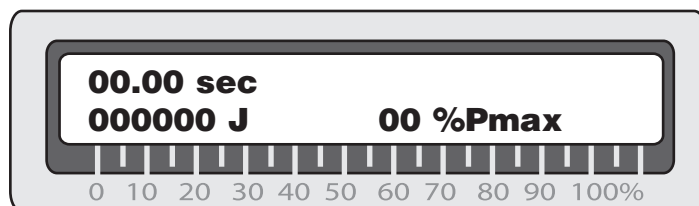
The CLEAR key will clear an existing value to 0, displayed as a series of dashes, and relocate the cursor to the extreme left-hand entry position ready to accept entries again. As soon as a desired value is keyed in and displayed, pressing the ENTER key makes the system accept that entry. If a number value is not “Entered,” then it will not be accepted by the system and the parameter value will return to its former setting (before any numerical values were changed).

## OPERATIONAL FEATURES

- Adjustable Afterburst Timer to separate parts from horn.
- Adjustable tolerance limits in energy (Ws) (XPE models only) and time (sec) with visual alarms.
- Information displays including: number of assemblies, number of rejects, and number of cycles.
- Fault displays.
- Keypad security.
- Self-diagnostic input test.

## STARTING UP THE PRESS

Press the ON/OFF key to turn the press on. The LCD screen will display “Sequence” and show wattage and frequency information. Then the LCD screen will show the following “ready” display:

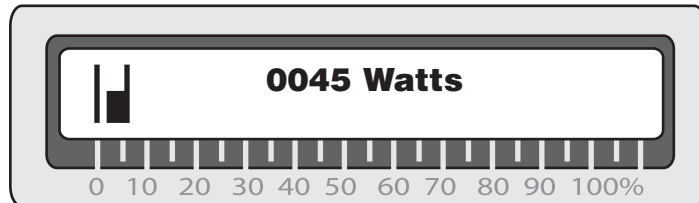


This display shows the last weld information – weld time, energy (XPE models only) and power. (After power down and subsequent power up, values are cleared to zero.)



## TEST FEATURE

After the press is turned on, press and hold the **TEST** button. While depressing the **TEST** button, check the display. Make sure the bar graph indicator on the display (a series of vertical lines that register to the 0 to 100% load meter scale – see example below) does not exceed 20%.



**NOTE:** The TEST and Load Meter check should always be done for all cold start-ups, and for any start-up after the system has been idle for 20 minutes or more.

During the testing process, keep in mind that the ultrasonics are only activated as long as the TEST button is depressed – once you release the TEST button, ultrasonics is terminated.

A bar graph indicator reading of above 20%, signals that there may be a problem with the stack. If this occurs check your assembly and re-test.

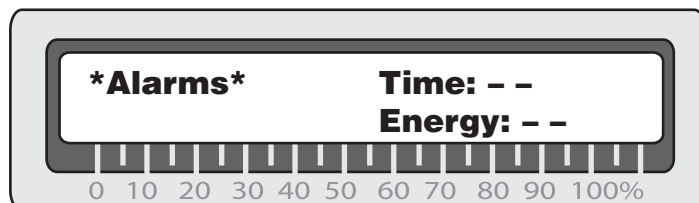
## Frequency Display

The TEST key can also be used to display the running ultrasonic frequency. Refer to page 19 for more information.

## READY SCREENS

In addition to the start-up ready screen (shown on page 15), there are 2 other “ready” screens. The press must be displaying one of the 3 ready screens in order for welding to commence. Welding cannot be initiated from any other display. The other 2 ready screens are as follows:

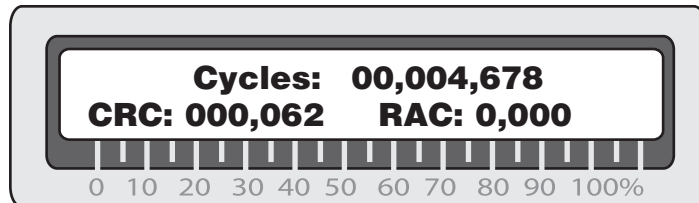
### Alarm Screen



The Alarm screen displays information about the alarm(s) that have been triggered by the system encountering parameters outside of the specified tolerance limits. The screen will indicate whether alarms occurred in Time or (on XPE models only) Energy. If there are no alarms, dashes will display. If

there are alarms, an L (for Low limit, indicating that the low limit was violated) and/or an H (for High limit, indicating that the high limit was violated) will display by the applicable mode (time or energy). Once another new cycle is begun, the system will automatically clear the current alarm.

### **Counter Screen**



The Counter screen displays information about the job number, the number of cycles run to date, the customer resettable counter (CRC) and the resettable alarm counter (RAC). The 2 resettable counters can be reset whenever desired by pressing the Clear key when the counter screen is displayed (the keypad must be unlocked).

### **RELATIONSHIP OF TIME AND ENERGY SETTINGS (FOR XPE MODELS ONLY)**

Parameters can be set in the time and energy menus. The settings in both of these menus should be taken into account when you are setting up a job since they do not function independently of each other and a parameter in one menu can impact the effect of a parameter in another menu.

For example, if you specify a weld time of 2 seconds and an energy setting of 2,000 joules, the weld cycle will be terminated by whichever of the 2 settings (Weld Time or Energy Setting) is reached first – that is, either when ultrasonics have been applied for 2 seconds or when energy equivalent to 2,000 joules has been delivered to the parts being assembled. If 2 seconds is reached before 2,000 joules have been delivered, the weld cycle will terminate regardless of the amount of energy delivered, and vice versa.

The start-up ready screen which shows the last weld information will show a flashing “sec” or “J” to indicate which setting was achieved first and thereby terminated the weld cycle. In the example above, if the weld time of 2 seconds is reached before 2000 joules have been delivered, the ready screen will display “02.00 sec,” with the “sec” flashing, along with whatever energy was delivered. The peak power delivered (%Pmax) will be displayed as a percent of the supply rating.

The ability to specify Time and Energy affords maximum control of the weld process. However, when entering your specifications in the various menus

described below, keep in mind that the settings from previous use remain in effect until you make a change and use the Enter key to register a new value. This means that if you want to achieve a weld time of 2 seconds, for example, you will need to ensure that other entries in the Energy menu will allow a 2-second weld before an Energy setting is reached (and ultrasonics are terminated).

## TIME SETTINGS

There are six time parameters, or timers, that can be set. They are accessed by pressing the Time key which allows specification of the following time parameters. The first menu display will show the following:

**Weld Time** – sets the duration of time for which ultrasonic vibrations are applied to the parts. A time value must be entered in order to weld.

Press the Time key again (and successively after each menu display) to advance to these next screen displays:

**Hold Time** – sets the duration of time for which pressure is maintained to ensure proper bonding of the parts, after the actual weld time and with ultrasonics off. (This allows the weld to cool.)

**Delay Time** – sets the duration of time allotted for pressure to build up after the parts have been contacted and before the application of ultrasonic vibrations to the horn.

**Afterburst Time** – sets the duration of time for another application of ultrasonic vibrations to the horn (for “shake-off”) to ensure that the parts being assembled do not adhere to the horn.

**Time Limit Low** – sets the low time alarm examination point (as a tolerance limit). A time alarm will be triggered if the actual weld time is less than this value. The time low alarm will show on the Alarm Screen display and will be indicated by a flashing LED on the Time key. By specifying values for this limit and the Time Limit High, a weld time “window” is created that defines a “good weld.” (If no alarms are triggered – the weld cycle occurred within the designated time limits.)

**Time Limit High** – sets the high time alarm examination point. A time alarm will be triggered if the actual weld time is greater than this value. The time high alarm will show on the Alarm Screen display and will be indicated by a flashing LED on the Time key.



**NOTE:** If no time is set, an error message (“Set Weld Timer”) will display prompting a parameter entry.



## **ENERGY SETTINGS (ON XPE MODELS ONLY)**

There are 4 energy parameters that can be specified. These are accessed by pressing the Energy key, which allows specification of the following parameters. The first menu display will show the following:

**Energy Setting** – sets the amount of energy in joules to be delivered to the parts being assembled.

Press the Energy key again (and successively after each menu display) to advance to these next screen displays.

**Energy Limit Low** – sets the low energy alarm examination point (as a process control tolerance limit). An energy alarm will be triggered if the actual weld energy is less than this value. The energy low alarm will show on the Alarm Screen display and will be indicated by a flashing LED on the Energy key. By specifying values for this limit and the Energy Limit High, a weld energy “window” can be created in which a “good weld” can occur. (If no alarms are triggered – the weld cycle occurred within the designated energy limits.)

**Energy Limit High** – sets the high energy alarm examination point (see Limit Low above). An energy alarm will be triggered if the actual weld energy is greater than this value. The energy high alarm will show on the Alarm Screen display and will be indicated by a flashing LED on the Energy key.



**NOTE:** Major adjustments of amplitude and pressure are made on the press through the use of boosters and pressure controls.

## **AMPLITUDE**

The Amplitude Setting is used to make fine adjustments to vibrational amplitude, from 20% (minimum) to 100% (maximum).

## **FREQUENCY DISPLAY**

The TEST key can also be used to display the running frequency. When the press head is in the UP position, press and hold the TEST key for 3 seconds. The information on the display will change from the power display (watts) to a frequency counter display (Hz). After this switch, the power is captured (no longer updated) and the frequency display will update every second. This information can help diagnose problems with the horn and/or stack assembly.



## **OVERLOAD PROTECTION**

The overload protection circuit will terminate ultrasonics when the system is operated under adverse conditions, i.e., improper tuning, excessive power supply loading, loose or failed horn or booster, thereby protecting the power supply and other system components. When an overload condition exists, a repetitive beep will sound and the **O. L. RESET** button will illuminate and remain lit until the button is pressed (regardless of whether the condition is corrected or not). If a repeated overload condition exists, resolve the problem before a failure of the power supply occurs.

If an overload condition exists, refer to the actuator instruction manual which may recommend one of the following possible solutions:

- decrease horn force
- decrease amplitude (change booster or decrease output control)
- decrease downspeed
- check for loose or broken studs
- check the coupling surfaces between horn/booster and booster/converter
- check for cracked horn or booster
- check to see if the load meter exceeds 100% during weld process (if so, a higher powered unit is needed)

If you cannot remedy the situation, contact Sonics' Service Department at 1-800-745-1105.

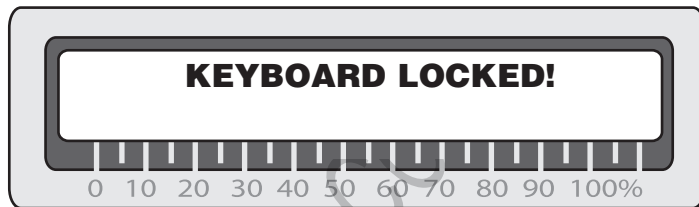


# KEYPAD SECURITY

---

The keypad can be “locked,” so that no new parameters or commands can be entered via the keyboard, thereby preventing unauthorized cancellation or adjustment.

To activate the security feature, press and hold the numeral 7 key on power up. When the keypad is secured in this manner, any attempt to change or enter parameters will result in the following message being displayed on the LCD screen:



To return to normal operation and unlock the keypad, power down and repeat the lock procedure – press and hold the numerical key 7 on power up.

# INITIAL EQUIPMENT SETUP



## WARNING

*Never tighten the horn to the booster using the housing door as the upper wrench as this may cause damage to the booster and/or converter.*

## ASSEMBLING AND MOUNTING CONVERTER, BOOSTER, AND HORN

If the converter, booster, and horn are not already assembled, follow these instructions:

1. Clean the mating surfaces of the converter and booster, as well as the threaded stud and hole. Check that the stud is tight (see recommended torque requirements on page 23).
2. Hand assemble the converter and booster together. Using spanner wrenches as shown below, tighten until snug. Then, using a torque wrench, tighten to 25-35 foot-lbs. (34-47 newton-meters).

**Do not force or overtighten.**



CONVERTER/BOOSTER

3. Clean the mating surfaces of the booster and horn, as well as the threaded stud and hole. Check that the stud is tight. (See recommended torque requirements on next page.)

4. Hand assemble the horn to the booster. Using a spanner and an open-ended wrench as shown below, tighten securely. Then, using a torque wrench, tighten to 25-35 foot-lbs. (34-47 newton-meters).

**Do not overtighten.**



CONVERTER/BOOSTER/HORN



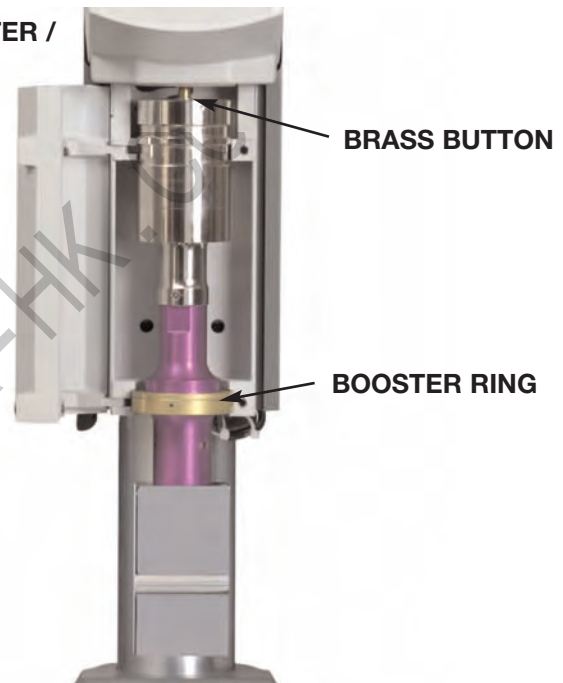
SONICS



**NOTE:** When performing any of the operations described on this page and pages 24-25, DO NOT turn on the press.

- Using the 3/16" (4.7 mm) T-handle wrench provided, loosen (turn counterclockwise) the two cap screws on the hinged converter housing and open the door.
- Place the converter / booster / horn assembly (stack) in the housing with the horn facing down. Fit the male brass button on the top of the converter into the female brass fitting in the bottom of the contact block assembly housing, and gently push the assembly up and in so that the booster mounting ring rests on the lower support ridge.

**CONVERTER / BOOSTER / HORN ASSEMBLY**



**WARNING**

Never tighten the horn to the booster using the housing door as the upper wrench as this may cause damage to the booster and/or converter.

- Close the converter housing door and tighten (turn clockwise) the two socket head cap screws until they are snug. Do not tighten the horn to the booster using the door as a clamp. Hand-forcing the horn on and off in this manner can twist wires in the converter and cause a failure. If the horn is not correctly oriented to the part, re-position the stack assembly by loosening the converter housing cover and rotating the stack.



**NOTE:** If you do not close the housing door once the assembly is in place, the assembly can fall out.

**RECOMMENDED TORQUE REQUIREMENTS**

| Component           | Foot-Lbs. | Newton-Meters |
|---------------------|-----------|---------------|
| Converter / Booster | 25 - 35   | 34-47         |
| Booster / Horn      | 25 - 35   | 34-47         |
| Stud                | 45        | 61            |
| Tips                | 25 - 35   | 34-47         |





## WARNING

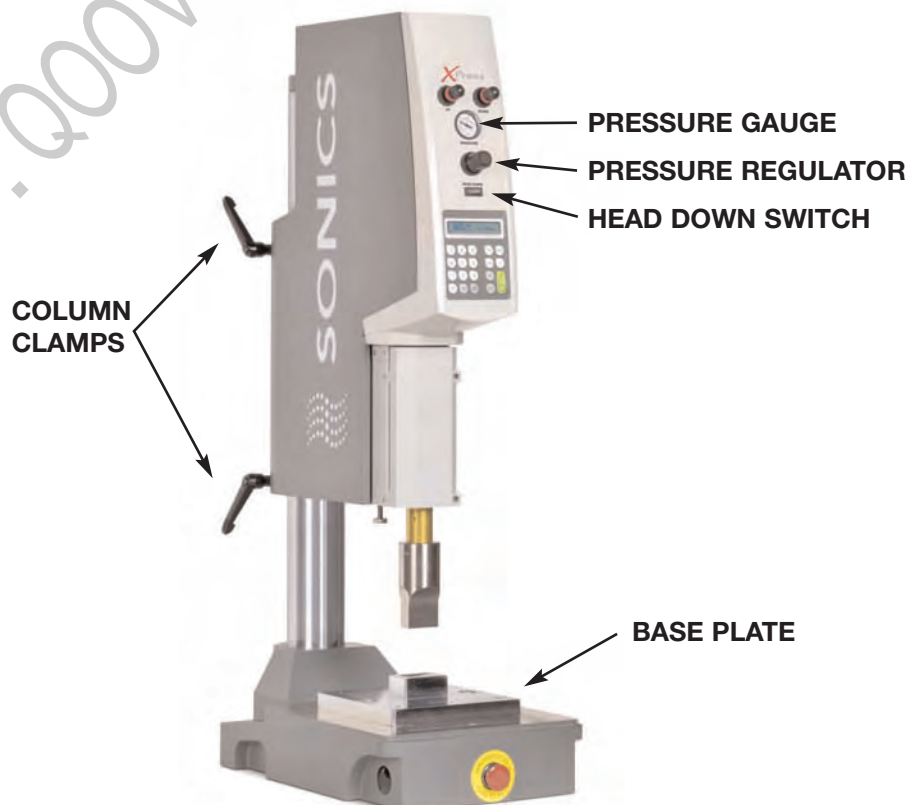
*Support the head before releasing the column clamps so that it cannot crash down or fly up. Ignoring this warning might result in injury and/or damage to the equipment and part being welded.*

## HORN AND FIXTURE ALIGNMENT

For maximum productivity, the clearance between the horn and the part should be at a minimum. However, adequate clearance should be provided to enable easy loading and unloading of the part from the holding fixture. The maximum stroke distance is 4" (101.6 mm). Ensure that the horn does not contact the part when the head is close to the limit of its down travel distance. Otherwise, the horn may not have sufficient distance to travel downwards to achieve a full depth of weld. Set welding height as follows:

First, position the holding fixture loosely on the machine base using 3/8-16 screws. Then, place the part to be welded in the fixture.

1. Prepare to loosen the column clamps, but be sure to hold onto the head assembly firmly as it can move rapidly up or down with heavy tooling once the clamps are released. While holding the head assembly, loosen the two column clamps (counterclockwise) and move the head up or down as required. Then tighten the column clamps.
2. Using the PRESSURE REGULATOR (turn counterclockwise) and corresponding gauge, set the air pressure to zero.
3. Loosen the column clamps once again and manually lower the head until the horn contacts the part. Tighten the clamps.



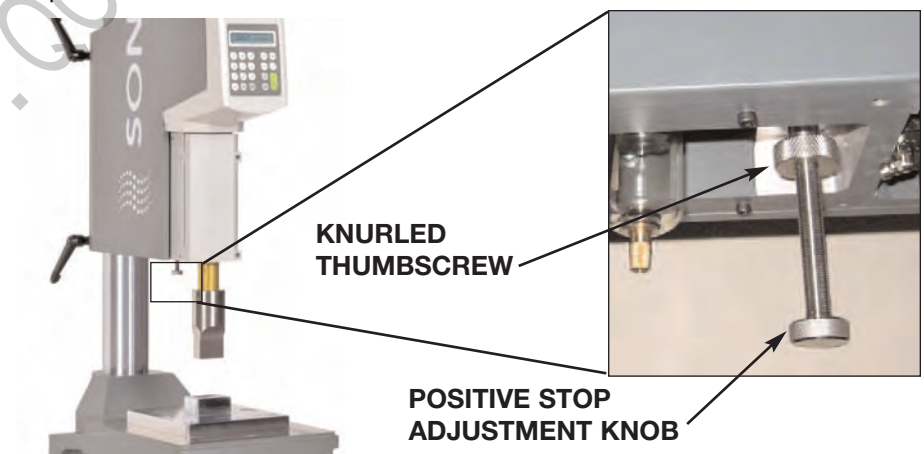


**NOTE:** For maximum safety and productivity, adjust the clearance between the horn and the part to a minimum that will still allow ease of loading and unloading.

4. Loosen the cap screws on the converter housing door and gently rotate the head and horn as required to ensure proper horn-to-part alignment.
5. Lock the two column clamps, tighten the converter housing door screws, and then tighten the fixture on the base plate.
6. Check for proper mating of fixture, parts, and horn. If the horn and part are not in parallel contact, shim the fixture or adjust leveling screws as required.
7. Set the PRESSURE regulator to a reading of 20 psig (140 kPa/1.4 bar) on the pressure gauge. (Turn the PRESSURE knob clockwise.)
8. To check that the horn and parts are properly aligned, the horn needs to be lowered. Read through the Operation instructions on page 26, and then proceed to lower the horn as detailed. If the horn and parts are not sufficiently aligned, then repeat steps 4 through 8. However, if you are working with small, delicate parts, then fine adjustments can be made using the positive stop adjustment knob as explained below.

### **POSITIVE STOP ADJUSTMENT**

The positive stop is set to limit the downward travel of the horn to approximately 75%. Readjustments may be required. Coarse adjustment of the clearance between the face of the horn and part should be made using the elevation control. Fine adjustment should be made using the positive stop.



The positive stop adjustment knob is located offset from the converter housing. Turning the knob clockwise will decrease downward travel distance. Turning the knob counterclockwise will increase the downward travel distance. Rotate the knurled thumbscrew to lock and unlock the positive stop.

A different positive stop is available for oversize horns. Contact factory for details.

# OPERATION



## WARNING

*The equipment has safety devices that require both hands to be on the palm buttons until the horn contacts the workpiece. **Do not defeat or modify these safety devices.***



**NOTE:** *Power cannot be shut off once the weld cycle has started. Termination of cycle can only be achieved by using the EMERGENCY STOP button.*



## WARNING

*Do not use with a footswitch unless alternate means of pinch-point protection is provided.*

## ACTUATION

The press is equipped with two maintained anti-repeat (non-tie-down) palm buttons, one located on the left and one on the right side of the base of the press. Both palm buttons must be pressed simultaneously to activate the press to cycle the welder. To operate the press, follow these simple steps:

1. Depress both black palm buttons simultaneously.
2. Once the horn comes in contact with the part, the pressure switch closes and the ultrasonics are activated, release the palm buttons. If you release the buttons before contact is made, the head will immediately return to its "home" position.

## EMERGENCY STOP

To abort the press during welding, simply press the red EMERGENCY STOP button located at the front center of the press base.

Once the EMERGENCY STOP button has been depressed, the head will retract and return to its "home" position. Simply rotate the EMERGENCY STOP button clockwise 1/4 turn to release the press for further operation.



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# FINE ADJUSTMENTS



**NOTE:** Consult the Applications Manual or call our Applications Lab for proper booster selection.



## WARNING

High gain boosters, such as silver and black in combination with high gain horns can result in the horn cracking or failing.

## BOOSTER SELECTION

The first step in optimizing welding conditions is to select a booster which will provide the necessary amplitude. For parts one inch (25.4mm) in diameter or greater, start with a moderately high amplitude booster such as a gold. For smaller parts, start with a green booster. Determine optimum amplitude by welding a few parts, and repeat the procedure with boosters giving higher or lower amplitude. If there appears to be little or no difference, use the booster giving the highest amplitude.

Seven standard boosters, color coded or engraved for ease of identification, are available either to increase or decrease the amplitude.

### BOOSTER

| Color  | O-Ring Mount (standard) Part No. | Rigid Mount (optional) Part No. | Gain | Amplitude Effect |
|--------|----------------------------------|---------------------------------|------|------------------|
| Black  | BHN15TBK                         | BHNR15BK                        | 2.50 | Increase         |
| Silver | BHN15TSI                         | BHNR15SI                        | 2.00 | Increase         |
| Gold   | BHN15GD                          | BHNR15GD                        | 1.50 | Increase         |
| Brown  | BHN15BR                          | BHNR15BR                        | 1.25 | Increase         |
| Green  | BHN15GR                          | BHNR15GR                        | 0    | No Change        |
| Purple | BHN15PU                          | BHNR15PU                        | 0.75 | Decrease         |
| Blue   | BHN15BU                          | BHNR15BU                        | 0.50 | Decrease         |

## PRESSURE

During the welding process, sufficient pressure should be applied to the part so that the mating surfaces contact each other. If the pressure is too low, the process will run inefficiently causing unnecessarily long weld time cycles, marking of the parts or poor welding. If the pressure is too high, the horn may stop vibrating, the part(s) might fracture, or the power supply might overload.



**NOTE:** Contact between the booster and horn should be parallel. When encountering symptoms such as loud noises or tuning difficulties, examine the booster / horn interfaces for parallelism, corrosion, galling or foreign deposits. Also check the integrity and tightness of the stud.



**WARNING**

DO NOT use anything coarser than 400 grit emery cloth.



**WARNING**

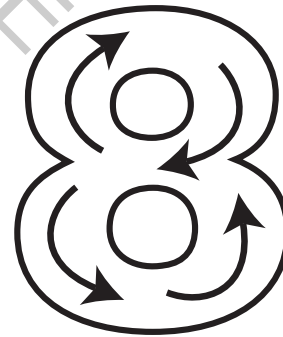
Machining of booster / horn may alter the ability to tune the component to the system. System inoperation may occur.

## RE-ESTABLISHING PROPER BOOSTER / HORN INTERFACES

To re-establish proper interfaces, follow these instructions:

1. Using open-ended wrenches, separate the booster from the horn. Clean each item and then examine interfaces for irregularities (scoring).
2. If irregularities are present, remove the stud.
3. Tape a sheet of 400 grit emery cloth to a smooth, flat surface. (Do not use coarser than 400 grit.)
4. Grasp the lower portion of the booster or horn and move it across the emery cloth. To ensure proper lapping, a) hold the part straight, b) apply light downward pressure, and c) move in one direction only in a figure 8 pattern.

Repeat the figure 8 pattern once more.



5. Then, rotate the booster or horn 1/3 of a turn in a clockwise direction and then repeat step 4.
6. Repeat step 5.
7. Using wire brush, clean stud, then replace securely. Tighten new stud to the recommended torque specifications on page 23.



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# MAINTENANCE



**NOTE:** If packing unit for return shipment, DO NOT use styrofoam “peanuts.”

## REPAIRS / SERVICE

If problems are encountered, contact our Service Department as follows:

Phone: 1-800-745-1105 • 1-203-270-4600 ext. 343 or 366

Fax: 1-203-270-4610

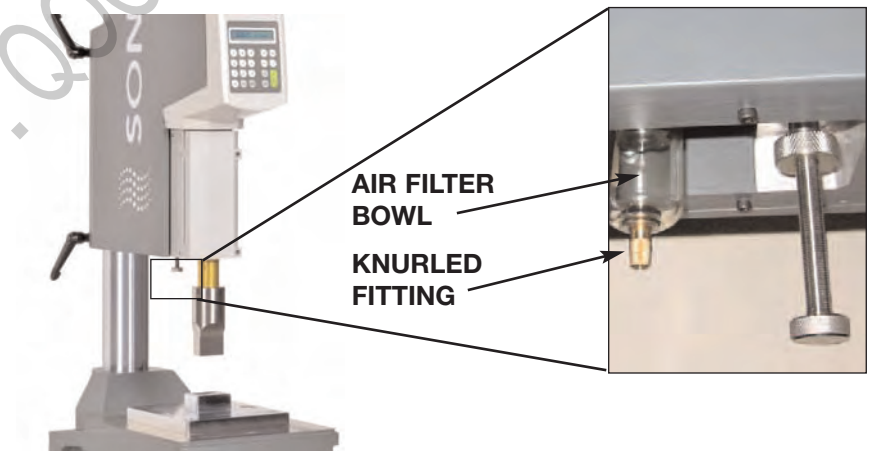
E-Mail: [service@sonics.com](mailto:service@sonics.com)

It is suggested that a system in need of repair be sent back to the factory, with a written description pertaining to the nature of the problem.

**Always contact the factory for return authorization** before shipping any instrument. Include date of purchase, model number, and serial number. For units not covered by the warranty, a purchase order should be forwarded to avoid unnecessary delay. Care should be exercised to provide adequate packing to insure against possible damage in shipment. The system must be sent with all transportation charges prepaid and return method of shipment indicated.

## DRAINING THE AIR FILTER BOWL

Periodically check the Air Filter Bowl for any moisture and/or condensation, and drain as necessary.



To drain, simply unscrew the knurled brass fitting at the bottom of the bowl. Drain any collected moisture, and then replace the fitting.

# WARRANTY

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Sonics & Materials, Inc., hereinafter referred to as "Sonics", warrants its products for a period of one year from the date of original shipment against defects in materials and workmanship under normal installation, use and maintenance as described in the operating instructions which accompany such equipment. During the warranty period, Sonics will, at its option, as the exclusive remedy, either repair or replace without charge for material and labor, the part(s) which prove upon our examination to be defective, provided the defective unit is returned to us properly packed with all transportation charges F.O.B. Sonics dock, Newtown, CT. Warranty period on equipment rentals that are converted to purchase are deemed to have commenced on the date of original rental equipment shipment.

Ultrasonic plastics welding horns constructed of titanium or aluminum are guaranteed against defects for a period of one year from date of shipment. Sonics will repair or replace a cracked or defective horn once without charge, if failure occurs within the warranty period.

Ultrasonic plastics welding horns constructed of steel are guaranteed against defects for a period of ninety days from date of shipment. Sonics will repair or replace a cracked or defective steel horn once at a charge of 50% of the original purchase price, if failure occurs within the warranty period.

Ultrasonic metal welding horns constructed of titanium or steel are guaranteed against defects for a period of one year from date of shipment. Sonics will repair or replace a cracked or defective horn once without charge, if failure occurs within the warranty period.

Sonics warrants its ultrasonic converters for a period of one year from date of shipment with a one-time replacement if a converter proves to be non-repairable.

When customer site service is required, all travel, living and related expenses will be billed at cost. In-warranty service labor time (including travel time) at the customers facility is provided Monday through Friday (excluding holidays) from 8:00 am to 5:00 pm. Any in-warranty service time requested outside of these days and hours will be billed at 150% of Sonics current rate per hour for such site service work.

## **LIMITATION OF WARRANTY**

This warranty does not apply to items subject to normal wear and tear or, to equipment or tooling which has been subject to unauthorized repair, misuse, abuse, negligence or accident. Misuse includes operation of equipment with tooling that is not qualified for the equipment or tooling not properly installed on the equipment.

Equipment which, in our judgment, shows evidence of having been used in violation of operating instructions, or which has had the serial number altered or removed, will be ineligible for service under this warranty.



For components and parts not manufactured by Sonics but included in Sonics manufactured equipment, this warranty shall be limited to the warranty as given to Sonics by said original component or part manufacturer.

Ultrasonic horns supplied by Sonics are manufactured to exacting specifications and are tuned to vibrate at a specific frequency. Using an out-of-tune horn will cause damage to the equipment and may result in warranty nullification. Sonics assumes no responsibility for converters, horns or fixtures not supplied by Sonics or for consequential damages resulting from their usage.

Ultrasonic converters showing signs of excessive heat or contamination, such as but not limited to, oils and moisture, are not covered by this warranty.

Warranty does not apply to ultrasonic horns quoted as prototype, experimental or of unusual design which, in our judgment are more likely to fail in use.

Warranty does not apply to re-sharpening of ultrasonic blade type cutting or slitting horns.

Warranty does not apply to knurl pattern wear on ultrasonic plastics and metal welding horns and tips.

Warranty does not apply to ultrasonic horn or tip face wear when used with plastics that are molded with fillers, such as but not limited to, glass or talc.

This warranty does not apply to ultrasonic plastics welding equipment, horns or fixtures where metal-to-metal tooling contact time is in excess of 250 milliseconds.

This warranty does not apply to used or re-built equipment.

This warranty is non-transferable.

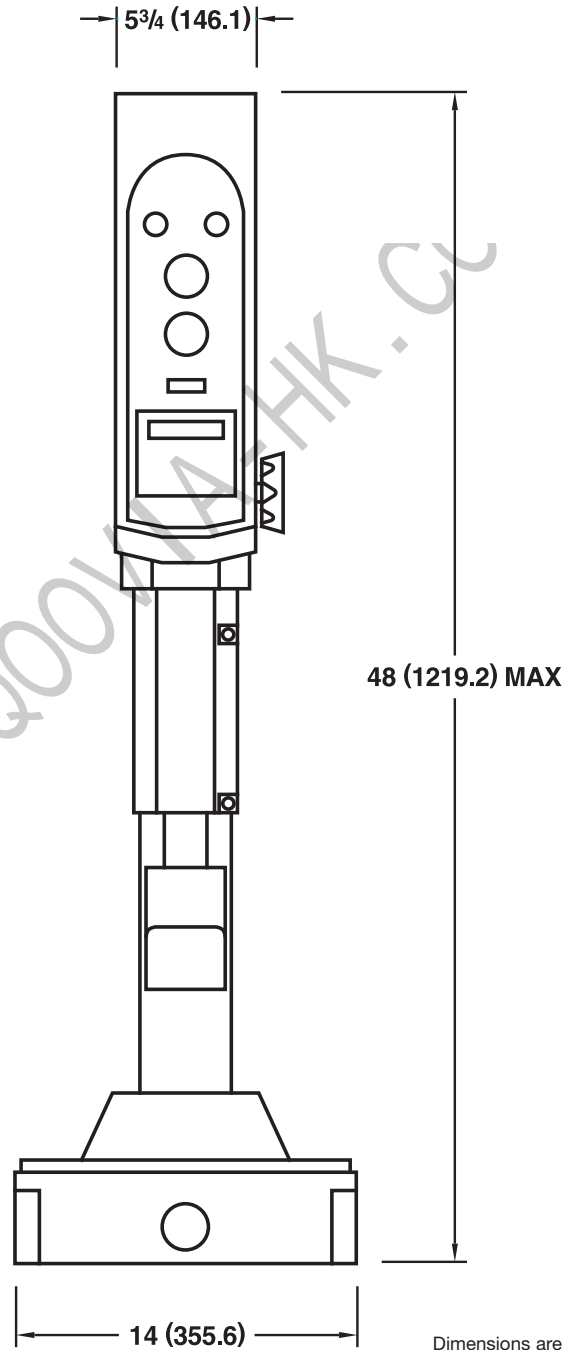
Data supplied in Sonics instruction manuals has been verified and validated and is believed adequate for the intended use of the equipment. If the equipment or procedures are used for purposes other than those specified herein, confirmation of their validity and suitability should be obtained in writing from Sonics. Otherwise Sonics does not guarantee results and assumes no obligation or liability.

This warranty is in lieu of any other warranties, either express, implied, or statutory. Sonics neither assumes nor authorizes any person to assume for it any other obligation or liability in connection with the sale of its products. Sonics hereby disclaims any warranty or merchantability or fitness for a particular purpose. No person or company is authorized to change, modify, or amend the terms of this warranty in any manner or fashion whatsoever. Under no circumstances shall Sonics be liable to the purchaser or to any other person for any incidental or consequential damages or loss of profit or product resulting from any malfunction or failure of this Sonics product.



# APPENDIX

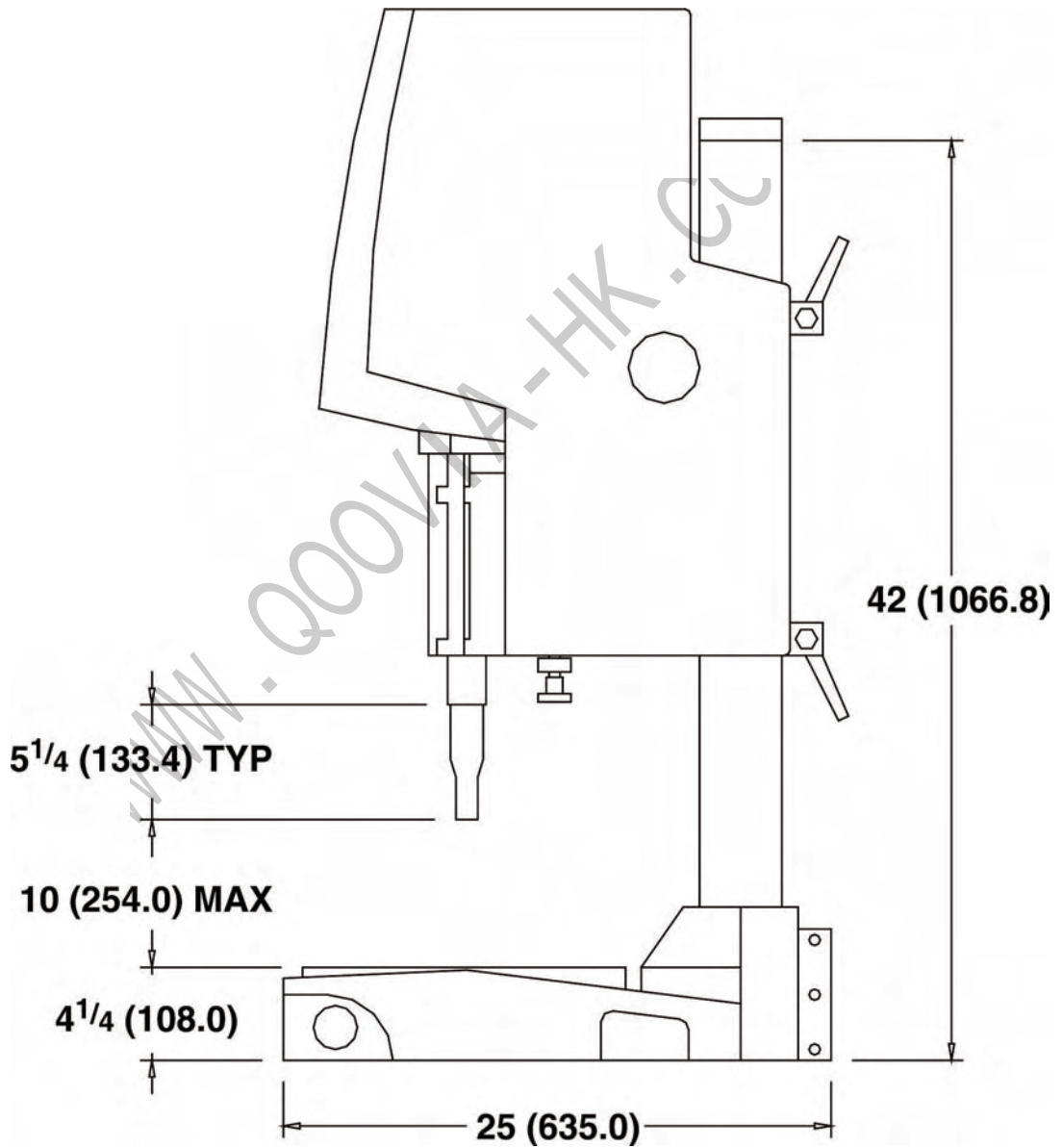
## X-PRESS LAYOUT FRONT VIEW



Dimensions are shown in inches and millimeters,  
i.e.,  $1\frac{1}{2}$  (38.1) signifies  $1\frac{1}{2}$ " (38.1mm)

# APPENDIX

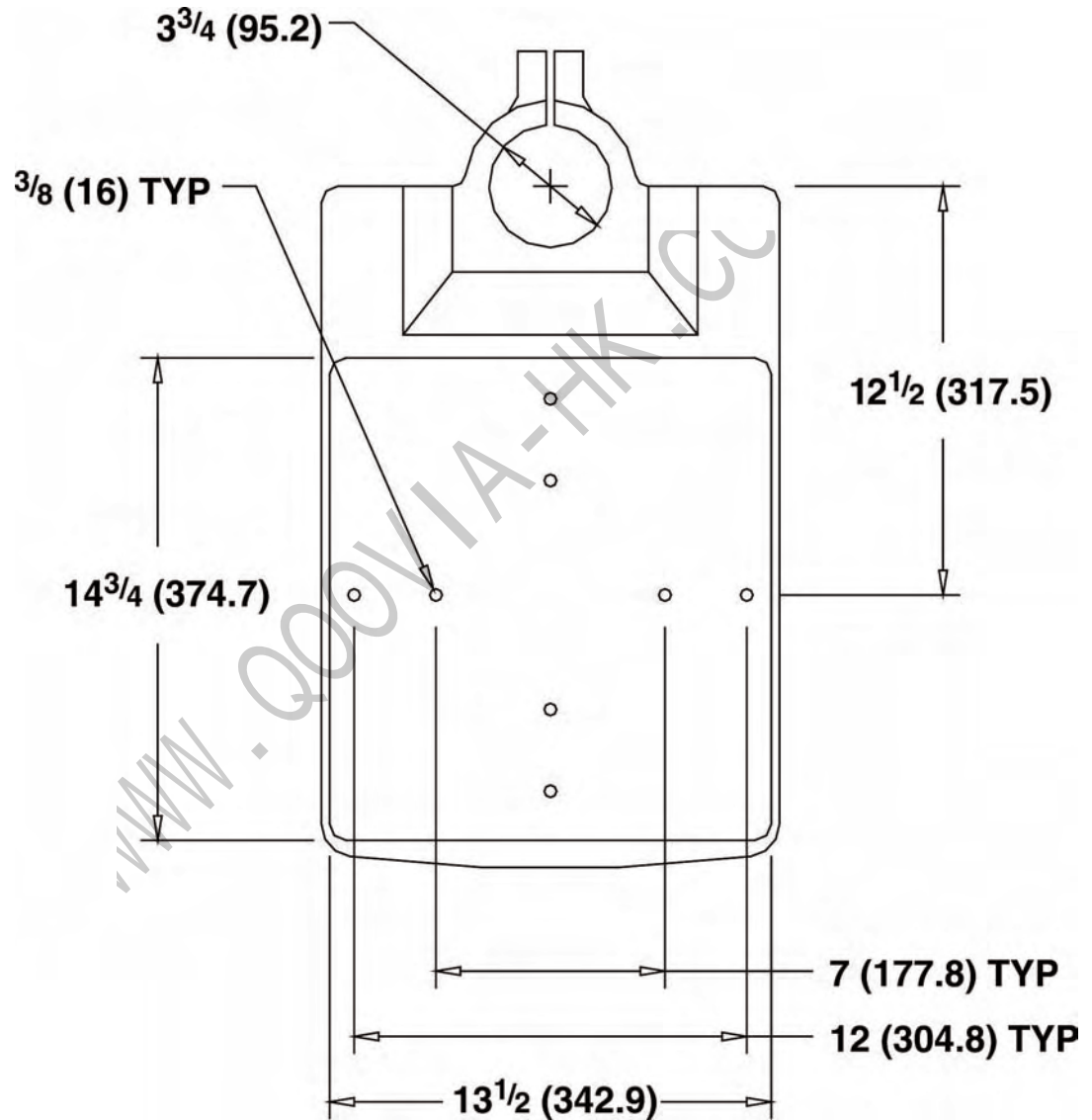
## X-PRESS LAYOUT SIDE VIEW



Dimensions are shown in inches and millimeters, i.e., 1 1/2 (38.1) signifies 1 1/2" (38.1mm)

# APPENDIX

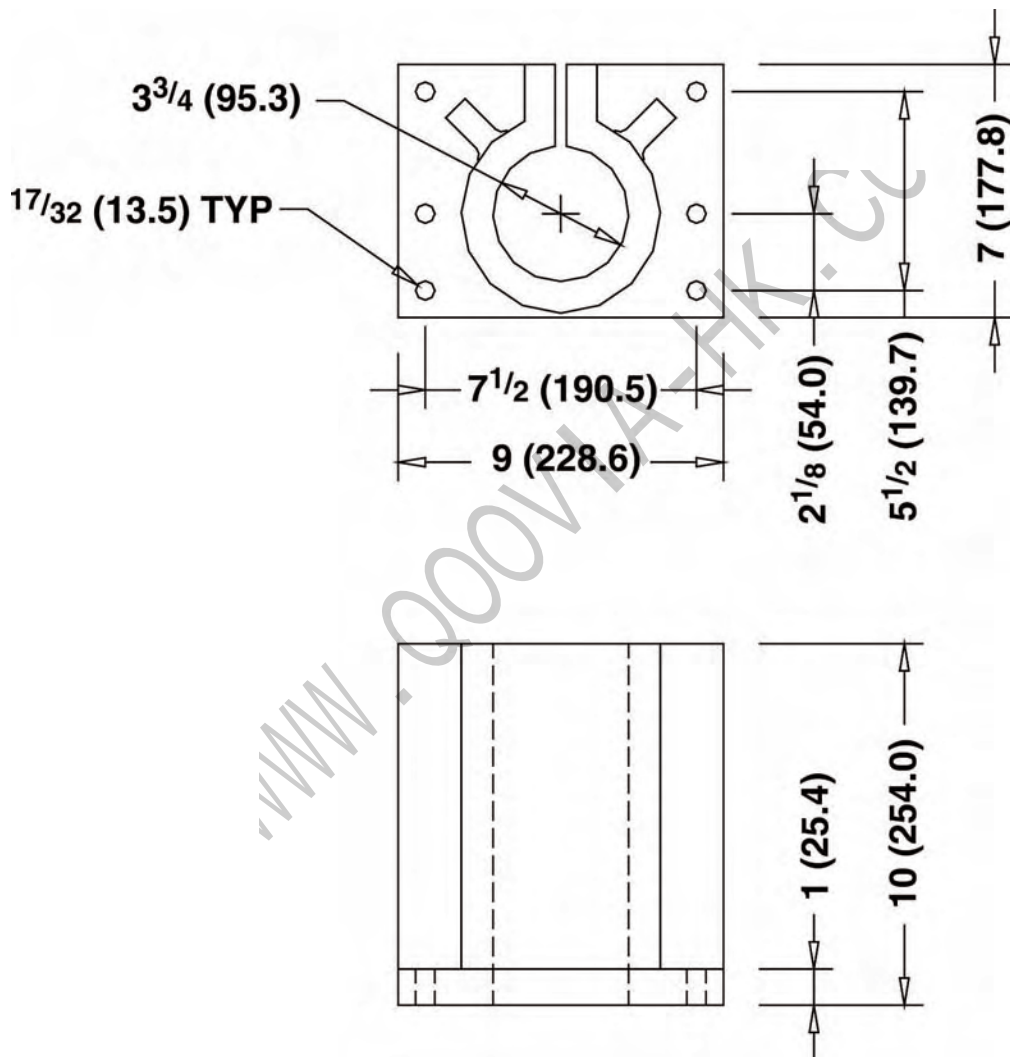
## BASE LAYOUT



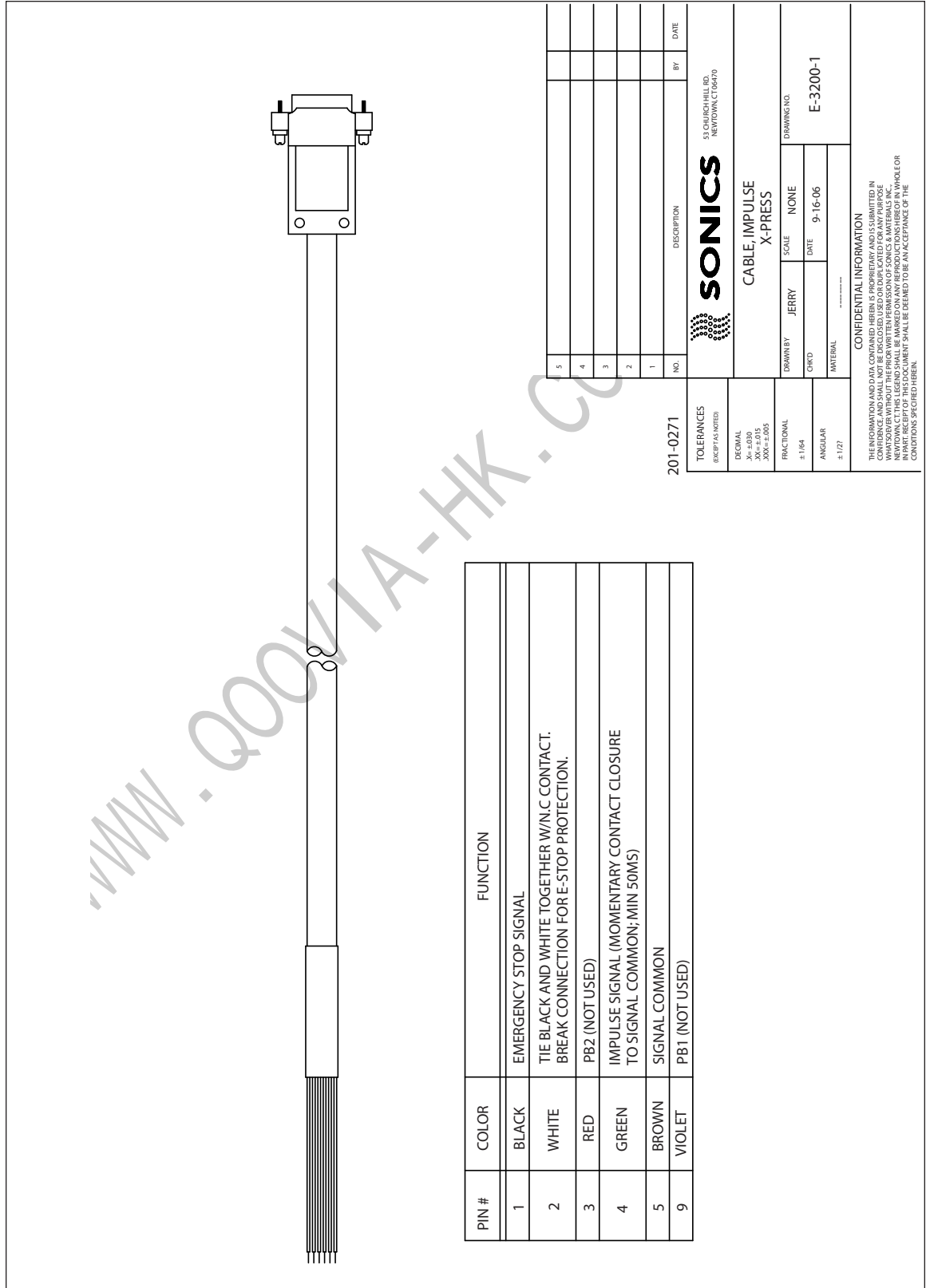
Dimensions are shown in inches and millimeters, i.e.,  $1\frac{1}{2}$  (38.1) signifies  $1\frac{1}{2}$ " (38.1mm)

# APPENDIX

## OPTIONAL STAND-ALONE MOUNTING HUB LAYOUT



Dimensions are shown in inches and millimeters, i.e.,  $1\frac{1}{2}$  (38.1) signifies  $1\frac{1}{2}$ " (38.1mm)



| PIN # | COLOR  | FUNCTION  |
|-------|--------|---|
| 1     | BLACK  | EMERGENCY STOP SIGNAL   |
| 2     | WHITE  | TIE BLACK AND WHITE TOGETHER W/C CONTACT. BREAK CONNECTION FOR E-STOP PROTECTION. |
| 3     | RED    | PB2 (NOT USED)  |
| 4     | GREEN  | IMPULSE SIGNAL (MOMENTARY CONTACT CLOSURE TO SIGNAL COMMON; MIN 50MS)             |
| 5     | BROWN  | SIGNAL COMMON   |
| 9     | VIOLET | PB1 (NOT USED)  |

| 5   |             |    |      |
|-----|-------------|----|------|
| 4   |             |    |      |
| 3   |             |    |      |
| 2   |             |    |      |
| 1   |             |    |      |
| NO. | DESCRIPTION | BY | DATE |

201-0271

**TOLERANCES**  
(EXCEPT AS NOTED)

DECIMAL  
XX ± 0.01  
XXX ± 0.05  
XXXX ± 0.005

**FRACTIONAL**  
± 1/64

**ANGULAR**  
± 1/2'

**SONICS**  
53 CHURCH HILL RD.  
NEWTOWN, CT 06470

**CABLE, IMPULSE X-PRESS**

DRAWING NO. E-3200-1

SCALE NONE

DATE 9-16-06

DOWN BY JERRY

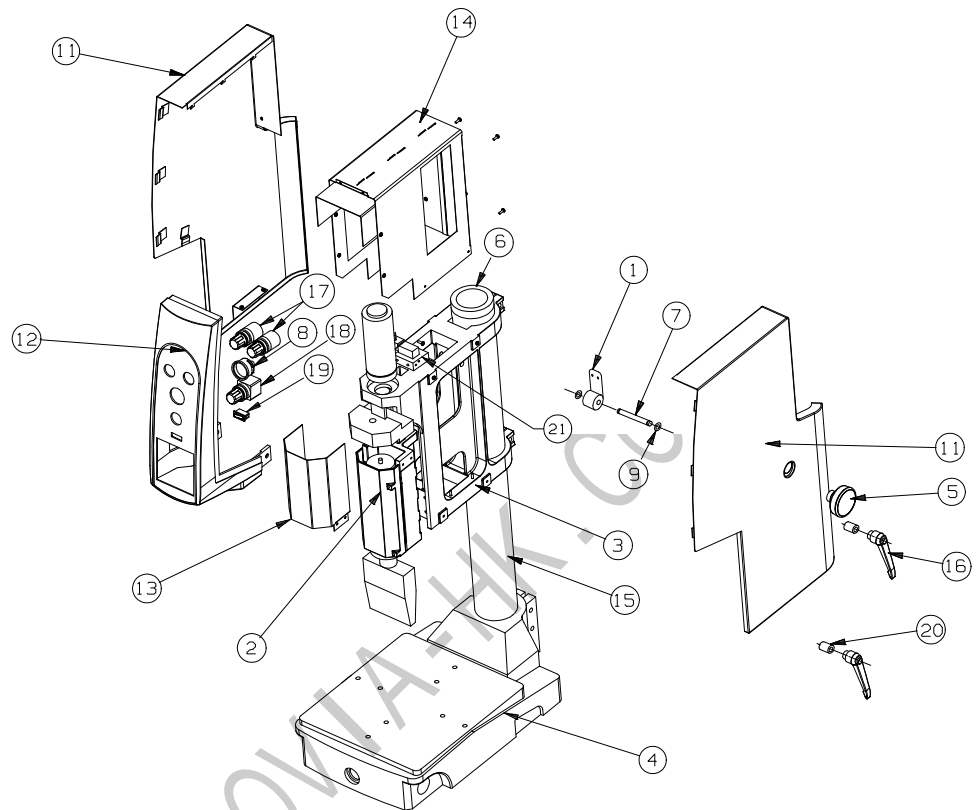
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MATERIAL

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## EXPLODED ASSEMBLY DRAWING



| PART NO    | ITEM | QTY | DRAWING NO  | DESCRIPTION                   |
|------------|------|-----|-------------|-------------------------------|
| 872-00034  | 1    | 1   | SMI-2079-27 | SPRING TRIPLE DRUM ASSY       |
| 301-0218   | 2    | 1   | SMI-2082-15 | CONVERTER CLAMP ASSY          |
| 301-0219   | 3    | 1   | SMI-2082-8  | CENTER FRAME ASSY             |
| 301-0220   | 4    | 1   | SMI-2082-7  | BASE ASSY                     |
| 515-0022   | 5    | 1   | SMI-1053-27 | KNOB, KNURLED                 |
| 516-0117GY | 6    | 1   | SMI-2079-5  | COLUMN CAP                    |
| 516-0119   | 7    | 1   | SMI-2079-17 | SHAFT, SPLINE 2050            |
| 804-00011  | 8    | 1   | SMI-2079-23 | PRESSURE GAUGE                |
| 810-00022  | 9    | 2   | PURCHASED   | RETAINING RINGS               |
| 810-00100  | 10   | 1   | NOT SHOWN   | LINEAR BEARING                |
| 818-0309   | 11   | 1   | SMI-2079-11 | PANEL COVER LEFT & RIGHT 2050 |
| 818-00347  | 12   | 1   | SMI-2082-5  | BEZEL, FRONT                  |
| 818-00317  | 13   | 1   | SMI-2079-9  | CONVERTER SHIELD 2050         |
| 818-00350  | 14   | 1   | SMI-2082-4  | FRAME ASSY. X-PRESS           |
| 820-00011  | 15   | 1   | SMI-2079-4  | COLUMN 3 3/4 DIA              |
| 841-00007  | 16   | 2   | PURCHASED   | HANDLE                        |
| 857-00003  | 17   | 2   | SMI-2079-23 | FLOW CONTROL                  |
| 865-00001  | 18   | 1   | SMI-2079-23 | REGULATOR                     |
| 875-00073  | 19   | 1   | SMI-2079-23 | HEAD DOWN SWITCH              |
| 516-0126   | 20   | 2   | SMI-2079-18 | EXTENDER COLUMN CLAMP HANDLE  |
| 806-00008  | 21   | 1   | PURCHASED   | AIR SOLENOID, 24 VDC          |